EDITORIAL INDEX—PAGE 103 BUYERS' DIRECTORY—PAGE 85 ADVERTISING INDEX—PAGE 104

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 7. Publication Office: Toronto, February 13, 1919 Subscription Price $3.00 per Year

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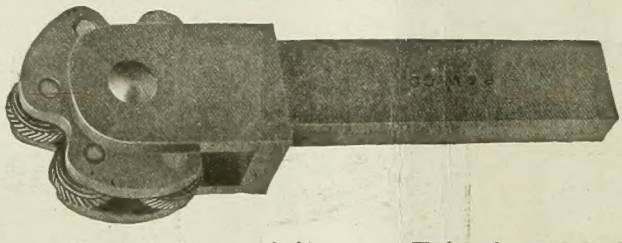
SMALL TOOLS

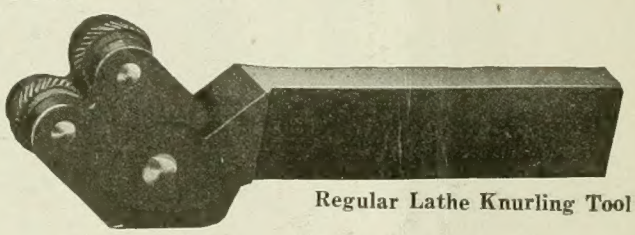
P. & W. Combination Lathe Knurling Tool



Combines Three Distinct Knurling Tools in One

You will save time by using this three-in-one Lathe Knurling Tool. It carries three pitches of knurls fine, medium and coarse, as shown in sample. This does away with necessity of having three holders or of changing knurls where but one holder is available. Same knurls can be used in this holder as are used in our regular Lathe Knurling Tool.

Fine Medium Coarse



Regular Lathe Knurling Tool

PROMPT SERVICE

is assured at our present store where P. W. Small Tools are carried in stock. Place your order there to-day.

Precision Machine Tool---Standards & Gauges

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Works: DUNDAS, ONTARIO

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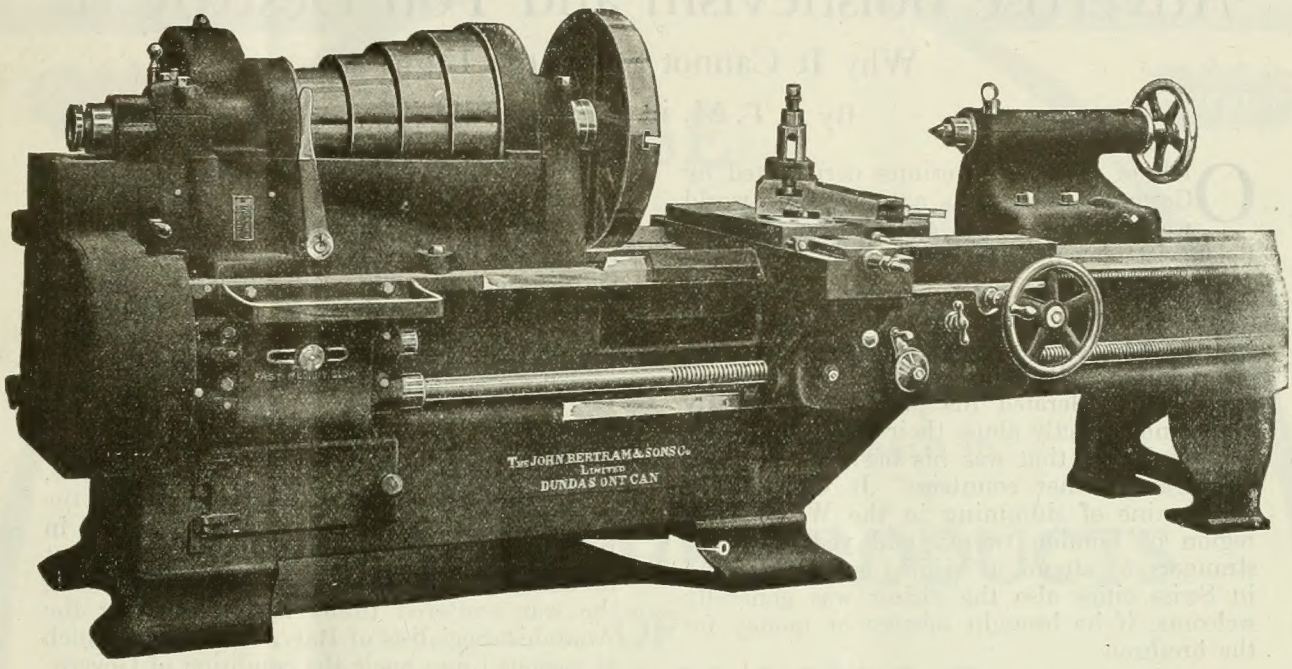
BERTRAM MACHINE TOOLS



Double Back Geared Gap Lathe

26-inch x 42-inch Swing

Bertram Machine Tools are built for safety and service, and are backed by a concern with sixty years' experience and the largest of its kind in Canada.

The John Bertram & Sons Co., Limited

MISCELLANEOUS DEPARTMENT

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609 Bank of Ottawa Bldg.

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The Publisher's Page

TORONTO FEBRUARY 13, 1919

Advertise Bolshevism and You Destroy It

Why It Cannot Stand the Light

By J. T. M. in Printers' Ink

ONE of the foulest crimes perpetrated by Germany against the nations of the world was the organizing against them of the Bolshevist movement.

The Russian of tousled hair and bushy black beard, with bombs protruding from his person, was regarded by most of us as merely a comic opera figure. But he existed. England and Switzerland tolerated his presence. Usually he did not directly abuse their hospitality. He conspired—for that was his business in life—but against other countries. It was part of the routine of slumming in the Whitechapel region of London twenty odd years ago for strangers to attend a Nihilist gathering, and in Swiss cities also the visitor was generally welcome, if he brought tobacco or money for the brethren.

The "group" generally consisted of a central directing figure of keen shrewd appearance, the herder of the flock, surrounded by a number of freaks, male and female; idealists and brutes; mental, moral and emotional defectives. Sunday afternoons were the popular gathering occasions for the Nihilists in the Houndsditch and old Spitalfields sections of London.

In a badly-lighted, evil-smelling garret the unkempt fraternity would hold meetings when strangers arrived, and seemingly more for the benefit of the latter than for any other discernible reason. The wise, and usually wolfish-looking, person in charge would designate a "speaker," and some poor blear-eyed degenerate would arise and rave and lash himself into a frenzy in a foreign tongue, until the slumming party became gradually nauseated and disgusted and decided to go, glad to donate a piece of silver for the "cause," especially as by that means there was better prospect of getting out once more to the fresh air unmolested.

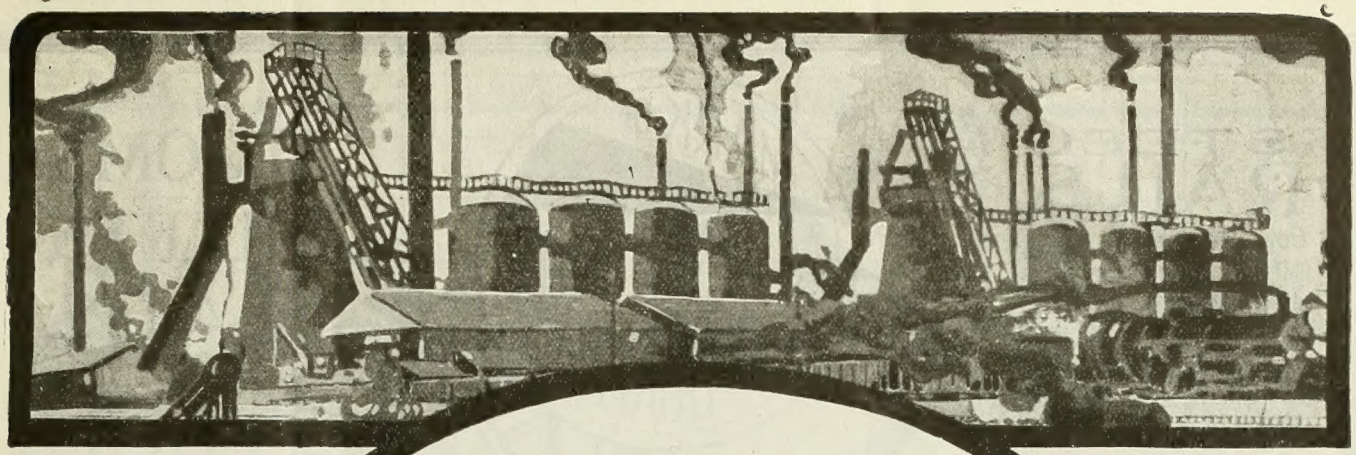
Who ever would have dreamed that a great nation would one day capitalize the Russian Nihilist, would one day organize such criminals and madmen as these for the spread of anarchism and for the destruction of that nation's adversaries?

Even before the war, Germany had begun to turn them to practical account. They were injected into the "Syndicats" in France and the sabotage committed against the French Government property, railroads and industrial plants by the Syndicalists is now known to have been carried out by anarchists under the direction and inspiration of individuals who were in relation with the German Secret Service. France never succeeded in rooting them out, and they are to-day the source of the most serious concern for her statesmen and officials. They were the criminal element also in the Internationalist body, with headquarters in Berne, which worked to such dangerous effect in Belgium before the war, and which during the war scattered funds lavishly among the Anarchist-Socialists of Italy, with results which at various times made the condition of Government in the Peninsula exceedingly insecure.

The grand coup by Germany, however, was the financing of Lenine and Trotzky and the dispatching of them to Russia to subvert law and order and to turn anarchy loose. How the emissaries worked and the methods they followed need not here be described, nor need there be mention of the retribution which Germany brought down on herself through the orgy of crime which she had so wantonly started. There are serious grounds for suspicion that organized anarchist movements in various lands are still directed from Germany.

Wars are usually followed by "waves of crime." The atrocious business of killing has a depraving effect on the morally weak, with psychological results which are fairly well understood. Such natures do not revert promptly to the modes of thought and sentiments of orderly life. Murderous brutality as it was taught to the German soldier could only leave a moral ulcer not easily eradicable. The wave of crime is intensified where civic discipline has broken down, where social disorder is attended by privations of every kind. Poverty and hunger breed the bandit and the outlaw. Germany taught the vilest outlaws of our time how to organize, and on Germany falls the responsibility for whatever waves of

CONTINUED ON PAGE 61



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Service

USE GOOD JUDGMENT

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PURCHASE THE PRODUCTS OF CANADIAN MILLS

A Canadian Dollar
is Worth One Hundred Cents
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Open Hearth Quality
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Sulphuric Acid. *Nitre Cake.*

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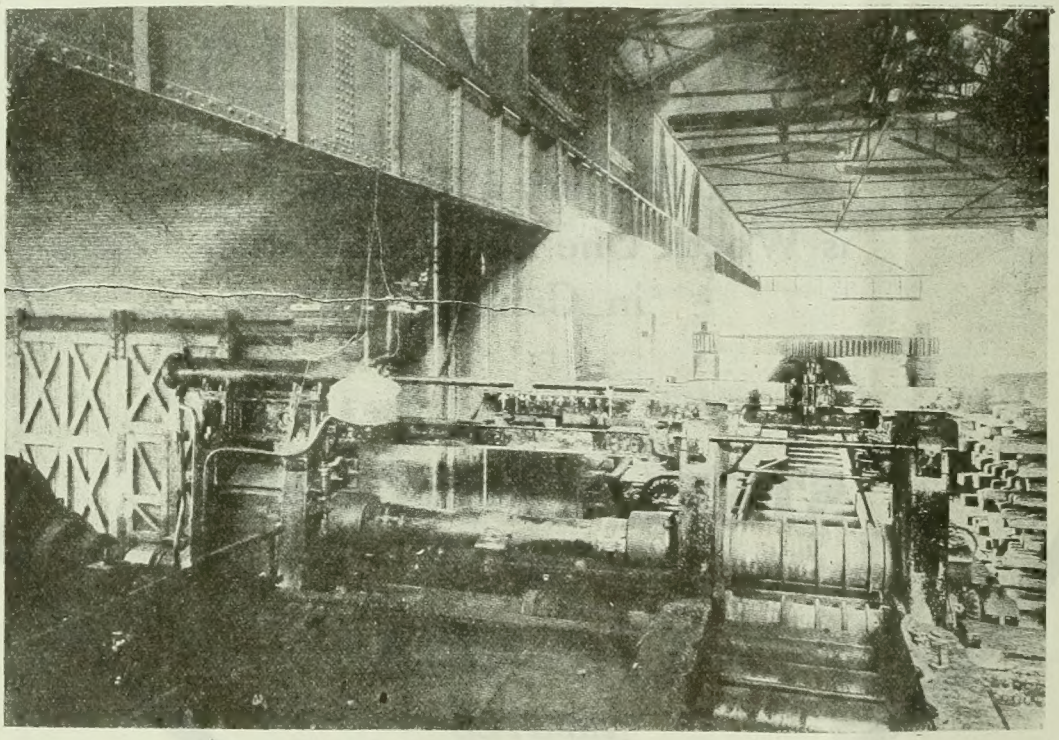
IRON, BRASS AND BRONZE CASTINGS



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SAULT STE. MARIE, ONTARIO

WILT
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"Where there's a WILT — there's the Way"
No other twist drills served the strenuous demands of war production better than the WILT. The reputation for QUALITY established by WILT DRILLS during the war will not only be maintained, but will be improved in times of peace. Put them to the test. You'll find them best.
Wilt Twist Drill Company
of Canada, Limited
Walkerville - Ontario
London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C. 2, England.
HIGH SPEED AND CARBON TWIST DRILLS

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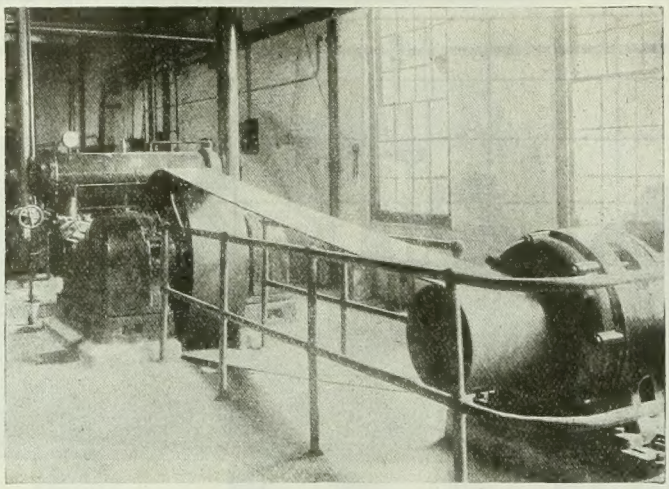

Repeat Orders Talk---There is another of our "PLB-2" Air Compressors in this Montreal Plant

The "PLB-2" Air Compressor Bulletin is K-301-A

Canadian Ingersoll-Rand Company, Limited.

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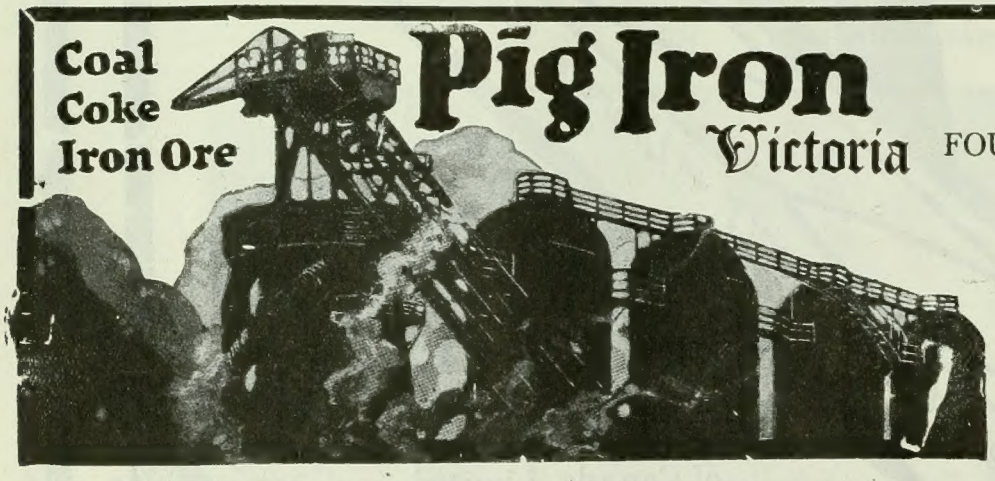

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CANADIAN STEEL FOUNDRIES, LIMITED
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Electric furnaces, automatically regulated, the most modern methods, and the **introduction of Uranium** — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

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Alloy Steels
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Annealed
Piston Rods Rough Turned
Annealed
Blue Ribbon
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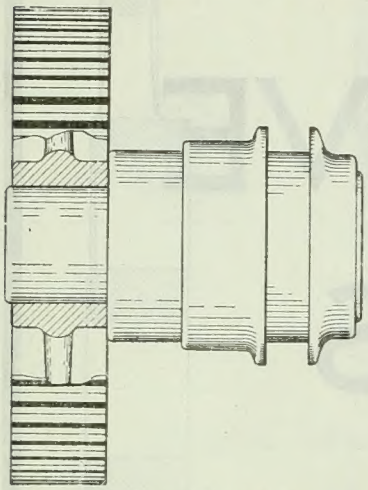
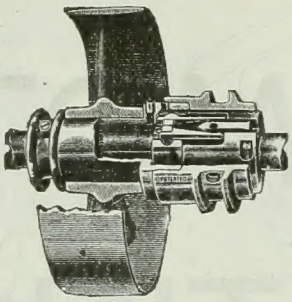
General Steel Company
Milwaukee, Wisconsin
DETROIT - 823 Dime Bank Building

THE JOHNSON FRICTION CLUTCH

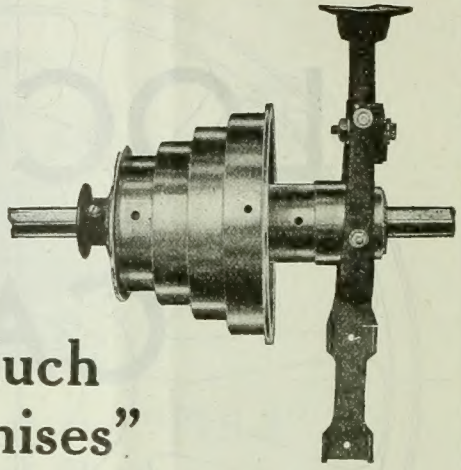


Gear Mounted on Clutch Hub.



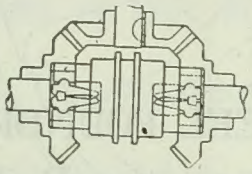
Pulley on Hub Clutch Engaged.

"Records Are Much Better Than Promises"



Cone Pulley on Hub and Style "A" Shifter.

Ask us for the names of builders of machines such as you make. For every requirement there is a JOHNSON FRICTION CLUTCH.



Double Clutch in Nest of Gearing.

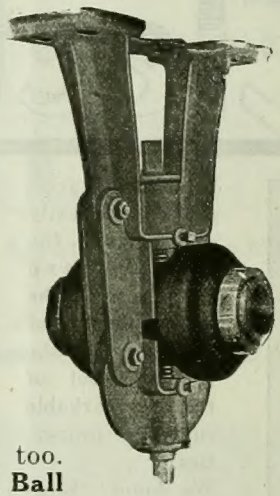
Send for Our Yellow Data Sheets

CANADA: Williams & Wilson, 320 St. James St., Montreal. The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND: The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1., Sole Agents for British Isles. AUSTRALIA: Edwin Wood, Pty., Hardware Chambers, 231 Elizabeth St., Melbourne, Victoria. JAPAN: Andrews & George Co., Takegawa-cho, Kiobashiku, Tokyo. SOUTH AFRICA: D. Drury & Co., Main St., Johannesburg. FRANCE: Anciens Etab. Glaenzer & Perreaud, 18 Faubourg du Temple, Paris.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Chapman

Double Ball Bearings



CONSERVE POWER! There is too much power going to waste the world over. This fact has been noted by the British Government and sweeping reforms are contemplated in Great Britain.

Canada also wastes much power. A reform is necessary here, too. Babbitt bearings are being used too often where **Chapman Double Ball Bearings** should prevail. The adoption of Chapman Double Ball Bearings, wherever an axle or shafting needs support in the transmission of power, results in a saving of 75% of friction loss.

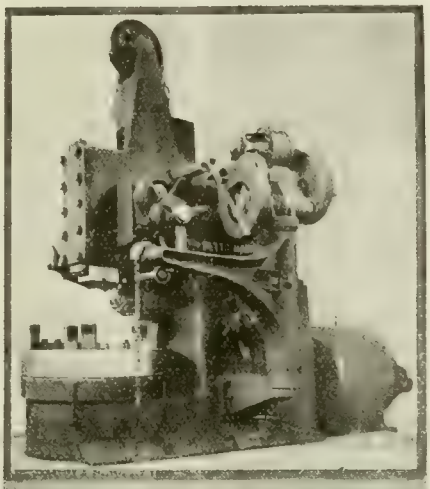
Now in use in over 2,000 Canadian factories. Fit any adjustable hanger. Adopted by Canadian and United States Governments.

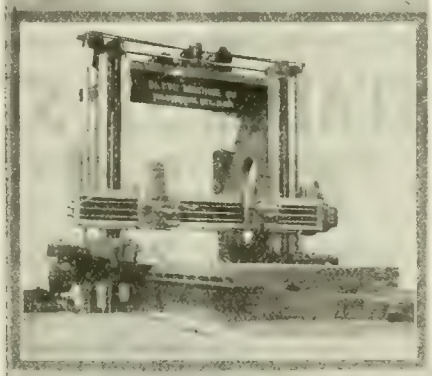
Write for full story of their efficiency.

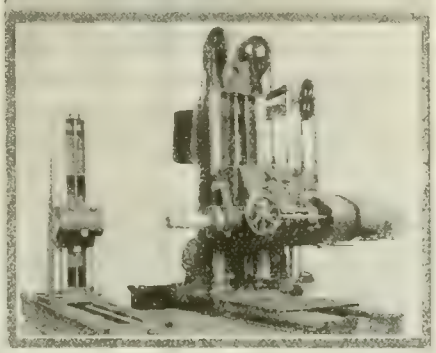
Chapman Double Ball Bearing Company of Canada, Ltd.

. . Room 408 Shaughnessy Bldg., Montreal. 339-351 Sorauren Ave., TORONTO, Canada.
Transmission Ball Bearing Co., Inc., 1050 Military Road, Buffalo, N.Y.

BETTS







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In the final analysis, the element that counts most in any business transaction is "satisfaction." This fact has been paramount in the minds of the builders of Betts Machines for more than fifty-seven years.

We are proud to include in our list of "satisfied" customers the names of many of the largest industrial concerns in the world, including railway shops, steel mills, shipyards, forge shops, locomotive works, electrical shops, Navy Yards, etc.

Detailed specifications, quotations and delivery on any Betts tool will be promptly furnished on request.

HEAVY BETTS DUTY

Planers
Boring and Turning Mills
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Etc.

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408 Blossom Rd. Rochester, N.Y.

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IMMEDIATE DELIVERY—Hamilton Stock

FOR IMMEDIATE SHIPMENT we offer the following

FORD-SMITH GRINDERS

Two 16″ Water Tool Grinders
Four 12″ Bench Water Tool Grinders
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One No. 14 General Purpose Grinder
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Five 6″ Bench Grinders
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Two 20″ Heavy Type Floor Grinders

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A quantity, imported from England, made with diamonds weighing about a carat and a half each and of the very best quality.

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One Lancashire 13 h.p., 3 phase, 720 r.p.m. 550 volts.
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One Can. Crocker-Wheeler, 5h.p., 25 cycles, 750 r.p.m., 550 volts, 3 phase

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Seven No. 4 Single Friction Clutches, manufactured by Carlyle-Johnson Machine Co., Manchester, Conn.

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Three No. 2 Plain Millers, complete
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MILLING MACHINE INDEX HEADS

One 12″ Cincinnati Plain Index Head
Two No. 1 Kearney & Trecker Plain Centres
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One 20″ Pollard & Shipman Single Geared Drill
One Hamilton Tool Co. Speed Drill

AIR CYLINDERS

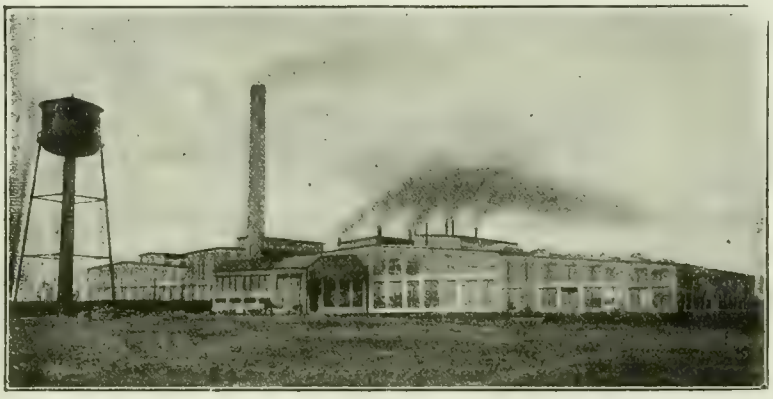
Eight 6½″ Air Cylinders, manufactured by Manufacturers Equipment Co., Chicago
Four 12″ Air Cylinders

We solicit your enquiries re above. On our Special and Standard Grinders, Belt and Motor driven, we can make prompt deliveries.

The Ford-Smith Machine Co., Ltd.

Manufacturers of Milling Machines, Floor Grinders, Polishers, Disc Grinders, Swing Grinders

Hamilton, Ontario, Canada



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FOR CUTLERY PURPOSES

Prices On Application

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Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by

THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

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"Not Steel but its Master"

STELLITE is not only the hardest metal on the market, but has other qualities possessed by no other metal.

The Alloy can be made in varying degrees of hardness, some of them being malleable.

They are highly resistent to acids being unattacked by Aqua-Regia and resist corrosion to a wonderful degree.

STELLITE might be of inestimable value to you in some of your mechanical difficulties. Consult our Engineering Department.

We may be able to plug the leak.

Deloro Smelting & Refining Company, Limited

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200 King Street West

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315 Craig Street West

WAR is destructive. Peace is constructive. War has taught us many things, chief of which is the great value of Time. Time is the essence of your life and mine. Whatever saves Time, saves Life.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is the avowed Enemy of Waste and Inefficiency, and allied with Life. Save Time, Save Life

Are your Tools made of **Red Cut**?

VANADIUM-ALLOYS STEEL CO.

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Swedish Steel & Importing Co., Limited

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Direct representatives of foremost Swedish mills: makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

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WOLFRAM

MADE IN THE U.S.A.

HIGH SPEED STEEL
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A Keen Cutter

WOLFRAM Is Both

Strong in the Neck

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Represented in Canada by Munro-Norton Gallard & Company MONTREAL QUE.

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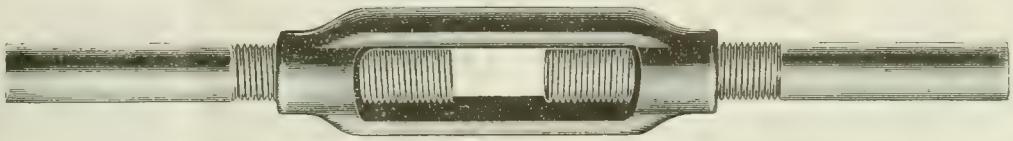
DROP FORGED STEEL



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16 Sizes, with or without Stubs
Large Stock---Quick Action

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Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED
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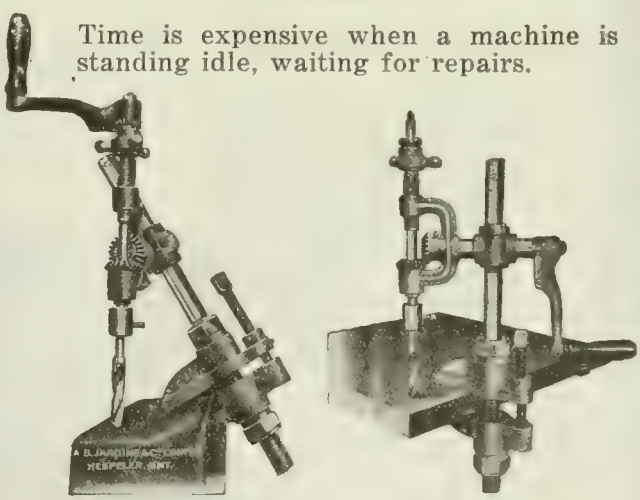
Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net.

Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
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"WACO"

TRADE MARK
"WACO"
TRADE MARK

High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada

GEO. A. MARSHALL & CO.
1118 Queen Street West, Toronto, Ontario

Phone Park. 250

STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

Steel Ingots *by the* HARMET Liquid Process

Nova Scotia Steel and Coal Co., Limited

Head Offices:
New Glasgow, N.S.

Western Sales Offices:
Room 14 Windsor Hotel
MONTREAL

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FUEL OIL BURNING FURNACES

IMMEDIATE DELIVERY

The next few years will see a great demand for agricultural implements. Heat treating the different parts, welding, forging, tempering, brazing, annealing or hardening is the work of

GILBERT & BARKER
Oil and Gas Burning Furnaces

They insure absolute temperature control, hence uniformity of product, perfect combustion and low cost of production.

For 50 years the name of Gilbert & Barker has been the recognized standard in the burning of gaseous and liquid fuels.

Catalog No. 24 will tell you all about it. Send for it. To-day is a better day than to-morrow—write.

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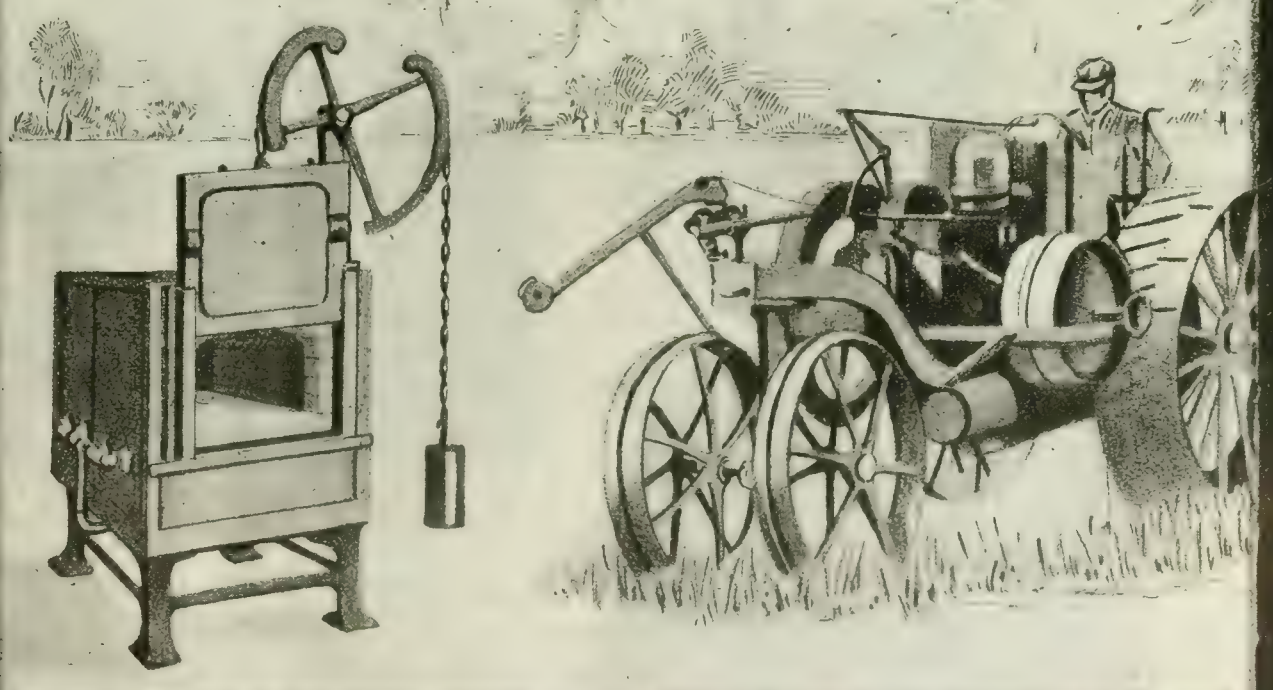
GILBERT & BARKER MANUFACTURING CO.
WEST SPRINGFIELD MASS. U.S.A

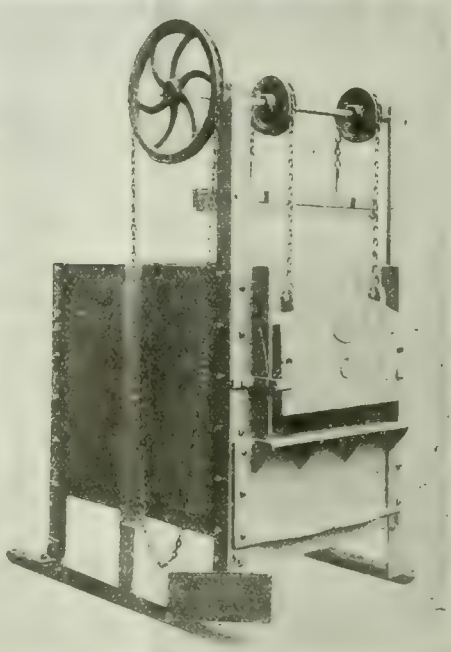


Do These Advantages Appeal

To Your Sense of Economy and Efficiency?

It's economy — requires one-half the space; costs less than half; no chimneys or flues required; instantaneous and perfect control of temperature; higher temperature obtained; no coal ash handlers required; no coal or ash piles; less waste of fuel, because it is shut off instantly; requires much less time to get the required heat. *Can you afford to lose the Advantages of this oil Furnace?*

OIL FURNACE
VERSUS
COAL FURNACE

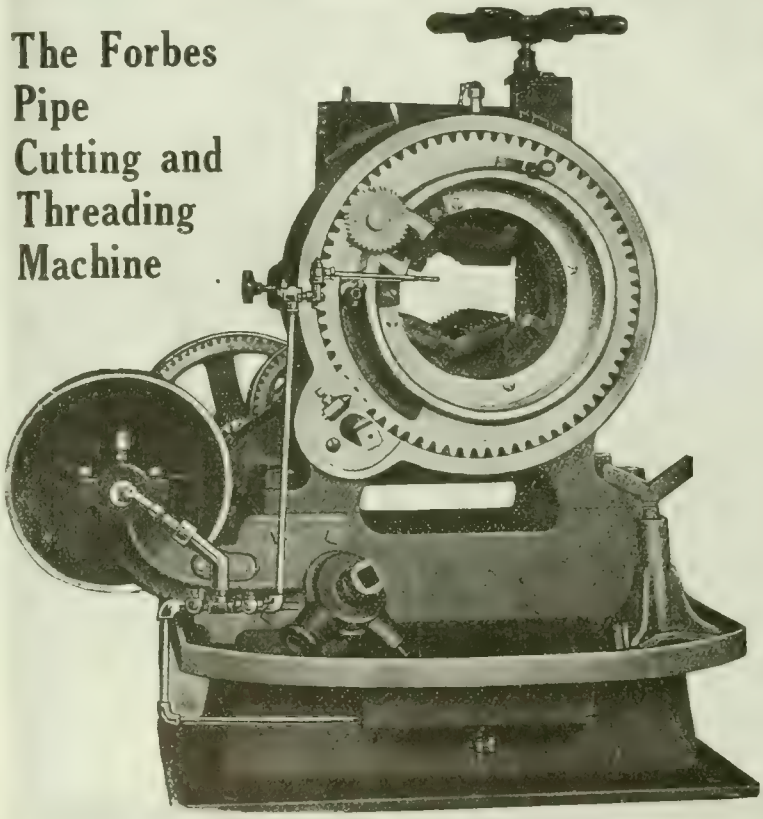


Write To-day for Full Particulars.

Mechanical Engineering Company,
55 Cote Street **Limited** **Montreal Que., Canada**
PHONE MAIN 3585 Cable Address: *"Mecol"*

CUTS THREADS FAST, CLEAN and TRUE

The Forbes Pipe Cutting and Threading Machine



One man can do the work of six against old Stock and Die method of cutting

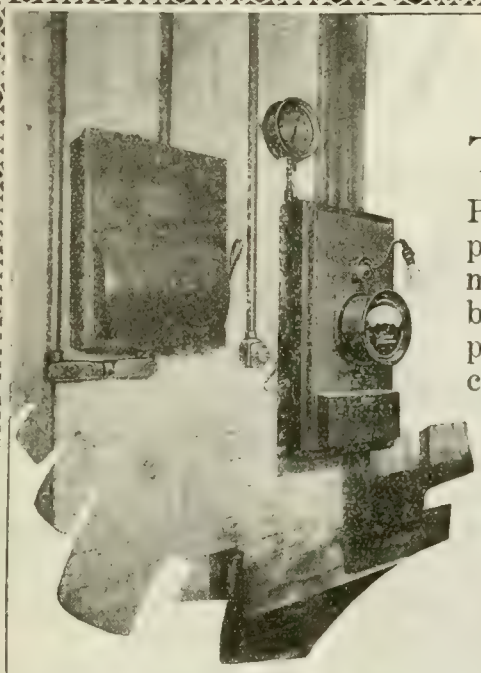
These are not exaggerated statements—they are facts that are being proven every day by Forbes' Users. Inquire for yourself. Investigate its performance closely and you can't help but admit its labor-saving, perfect-working value.

Inexpensive to Operate

It is simple, compact, self-contained, and all wearing parts are adjustable. One man can operate it and for heavy pipe work it can be taken right to the job. Fitted with self-centering vise that holds the heavy pipe stationary, while the dies turn around it. The latter are clamped and released by a throw of the lever.

Write for our latest bulletin giving full details

THE CURTIS & CURTIS CO.
Garden Street, Bridgeport, Connecticut, U.S.A.



Pyrometry

THE INDISPENSABLE!!

Pyrometry has safeguarded production in all great plants where high temperature is a vital factor. In metallurgical, ceramic and a host of other fields, by pyrometers, precision of results are rendered possible; absolute information available; the records of yesterday for to-day's guidance; standards of efficiency raised. Proud are we of the part *Tycos* Instruments have played in the upbuilding of great industries, and further to share with our worthy contemporaries the honor accompanying such pyrometer achievements.

Tycos Pyrometers

possess the many dependable qualities desired, mee ing in abundant measure your expectations. In short the endorsement of *Tycos* ; the preference exp essed have built up our great factories, still growing—**overwhelming endorsement indeed.**

To those unacquainted with us we seek acquaintance, be it through our literature, our advisory service, or a personal call. Command us.

The Taylor-Cambridge Division

Taylor Instrument Companies

ROCHESTER, N.Y.
201 Royal Bank Building, Toronto

270

Electric Welding by Alternating Current

WELDING STEEL PLATE
HAMILTON BRIDGE WORKS, HAMILTON, ONT

The

"MEPHISTO" WELDER

Operates on Alternating Current

Portable—Highest Efficiency—Lowest Operating Cost. No moving parts, therefore no wearing parts, no upkeep cost.

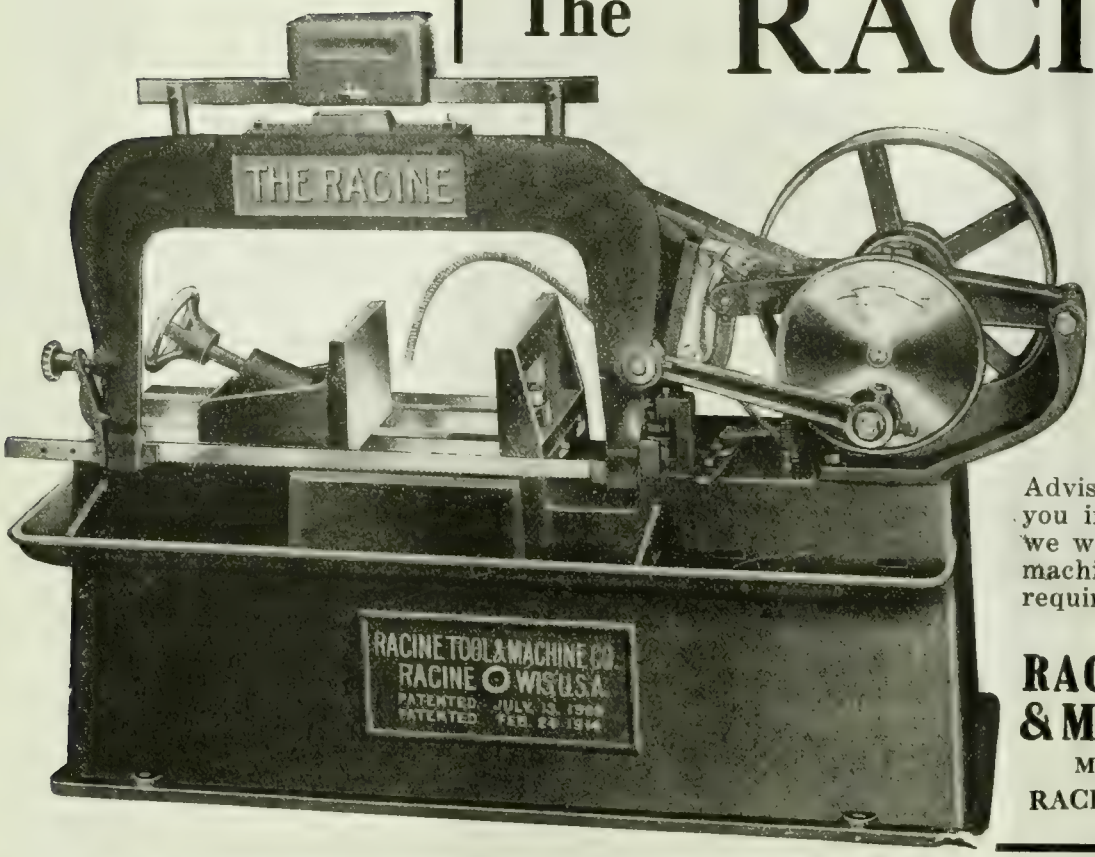
Reduces welding costs to minimum
Does not require expert to operate

The Arcwell Corporation of Canada, Ltd.

710 C.P.R. Building, Toronto

U.S. Office: 42 Broadway, New York City

The "RACINE"



For Speed

For Accuracy

For Quantity Production

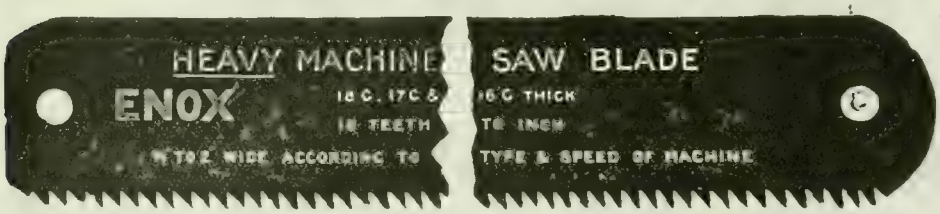
For Saving in Blade Costs

For Saving in Material

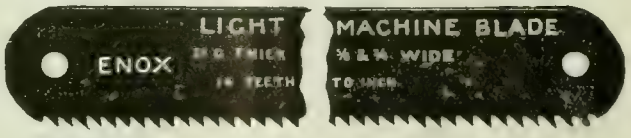
Advise us the size stock you intend cutting and we will quote you on a machine suited to your requirements.

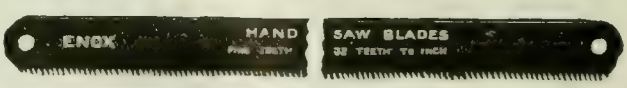
RACINE TOOL & MACHINE CO.
Melbourne Avenue
RACINE, WIS., U.S.A.

SIMONDS
HACK SAW BLADES
UNEQUALED IN QUALITY ANY SIZE OR LENGTH
Simonds Canada Saw Co. Limited
ST. JOHN MONTREAL VANCOUVER



ENOX
Hacksaw Blades
ARE THE BEST





AGENTS IN CANADIAN TOWNS WANTED

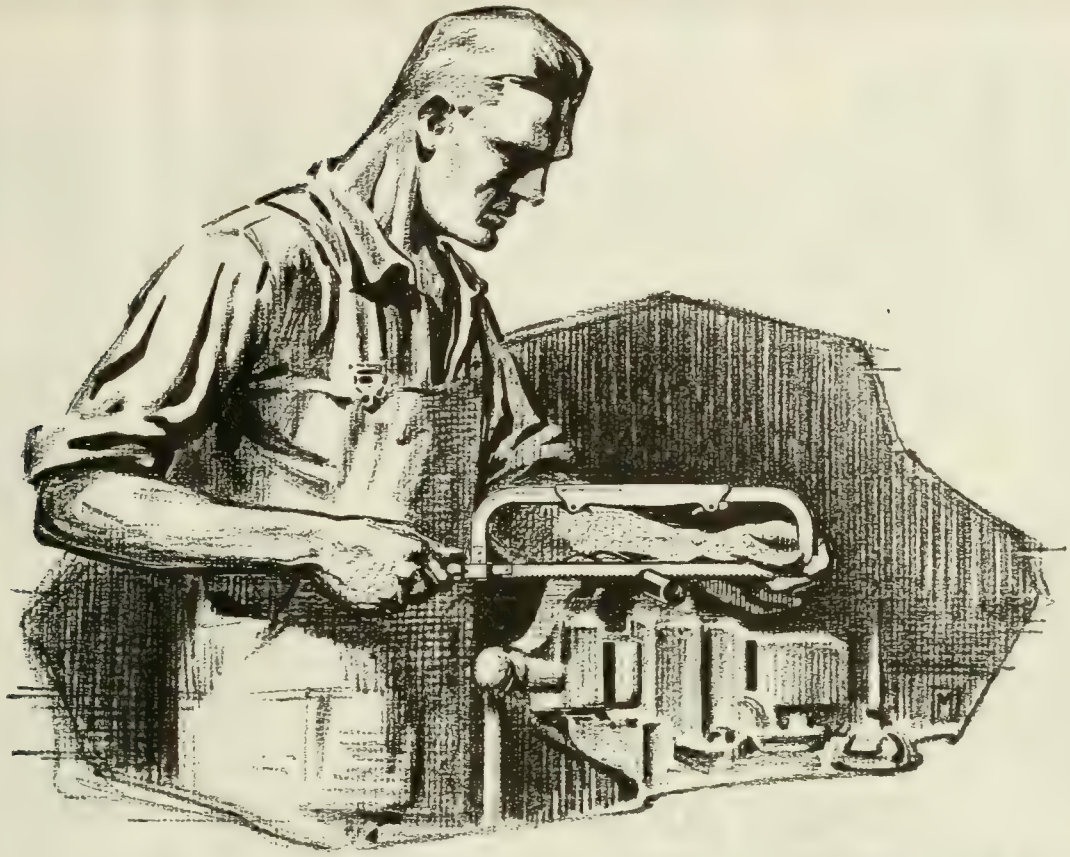
Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

46 Upper Thames Street, London, E.C. 4, England. Works: Greenwich, S.E. 10



Now for Low Cutting Costs

Goodbye to hack saw troubles. No more lost time.
I've changed from *any* hack saws to the

Starrett Hack Saws

Just one trial proved to me that the Starretts are the real economy saws because they give the maximum of service at the minimum of cutting cost.

Use the Starrett Hack Saws and you'll understand and appreciate why they are recognized as the real economy saws.

Write for our Catalog No. 21 3

It shows Starrett hack saws and frames; also many styles and sizes of fine precision tools that are recognized the world over as standard for accuracy.

Thə L. S. Starrett Company, Athol, Mass.

The World's Greatest Toolmakers.
Mfrs. of Hack Saws Unexcelled.

NEW YORK LONDON CHICAGO

12-880

STARRETT HACK SAWS CUT QUICKER LAST LONGER

If any advertisement interests you, tear it out now and place with letters to be answered.

An Innovation In the Field of Wall Radial Drills

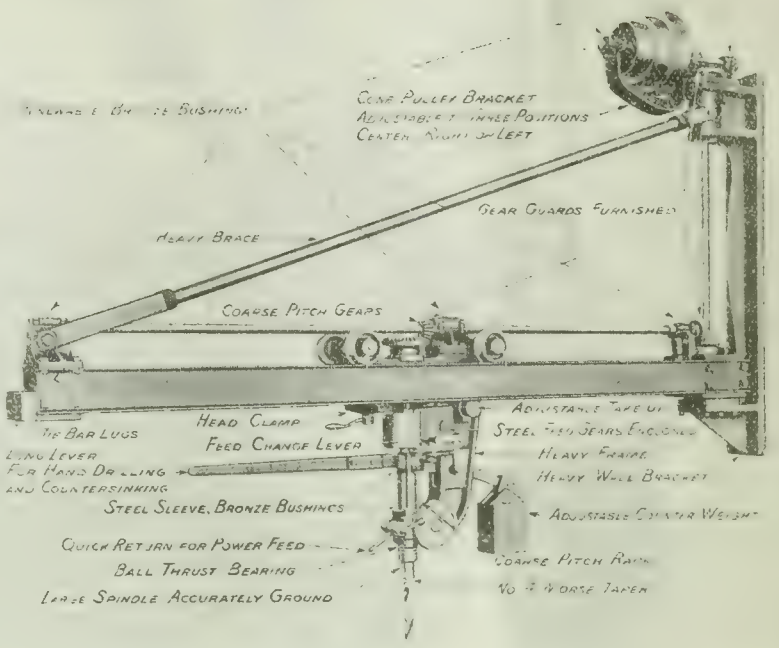
You really can't afford to be without this drill. It's a maximum producer, the entire control being placed within easy reach of the operator. Workmanship and material beyond criticism. Satisfied customers assure us the machine is a "dandy."

Better get our bulletin to-day, giving detailed description.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



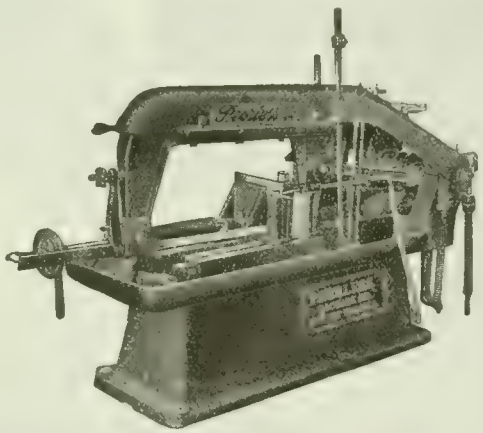
LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS.**

Peerless HIGH SPEED

THE NEW STANDARD

Increases Production—50 to 100%



REPEAT ORDERS—

Here we are talking about repeat orders again, but if you could see the way they come in you would pardon our dwelling on that subject.

The one striking feature about our repeat orders is that so many of them come from large concerns who had been reasonably satisfied with other standard makes before they put in their first PEERLESS High-Speed, and since then they have sent us order after order for more and more of our machines.

Surely there must be some good reason for this, which will be perfectly clear to you when you try out a Peerless for yourself.

Let us ship you one on thirty days' trial. If you don't keep it we pay freight both ways.

PEERLESS MACHINE CO.

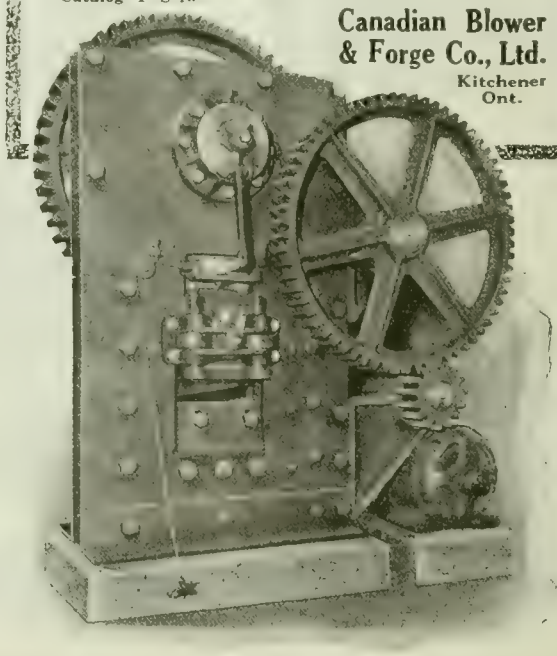
1607 RACINE STREET **RACINE, WISCONSIN**

CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.

That means a lighter and stronger machine—a machine built to take a lot of punishment. **Write for Catalog P/S-16**

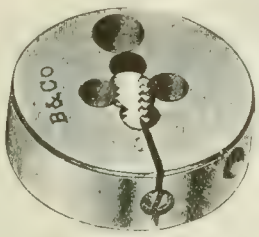
Canadian Blower & Forge Co., Ltd.
Kitchener Ont.

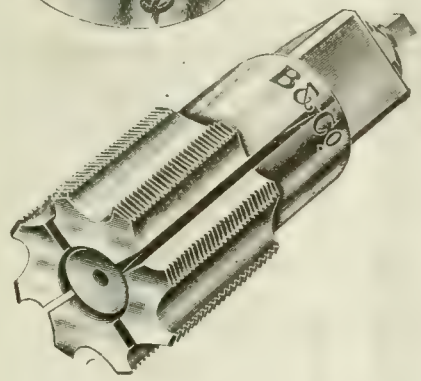


If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

Butterfield

Taps, Dies and Reamers





The Deciding Factor in Tool Economy is Quality

Every process in the manufacture of Butterfield Tools is performed by experts, whose entire aim is to produce the highest quality—and the rigid inspection prevents any possibility of inferior tools reaching the shipping room.

By the service afforded—by the ability to cut cleanly and accurately and to duplicate the work over a long period of use—Butterfield quality gives the maximum returns on your investment.

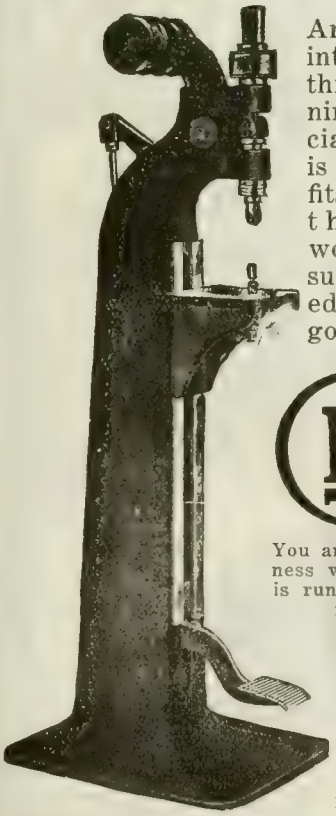
Butterfield Tools reflect splendidly our 35 years' continuous concentration on improvement in high speed tools. You can't go wrong with a Butterfield.

Send for Catalog No. 17. It's just out.

Butterfield & Co., Inc., Rock Island, P.Q.

Toronto Office: 220 King St. W.

No Skill Required



Anybody with ordinary intelligence can operate this Rotary Rivet Spinning Machine. No special skill is required. It is a tool that perfectly fits labor conditions as they exist to-day. A woman can operate as successfully as the skilled mechanic who has gone to the front.

The GRANT is Noiseless

You are assured of perfect quietness wherever the **Grant Rotary** is running. And it spins a perfect polished rivet head every second without breaking or marring the casting. Rivets tight or loose. Write for details.

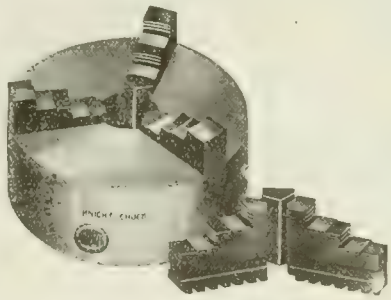
GRANT
Mfg. & Machine Co.
BRIDGEPORT, CONN., U.S.A.

"Knight" Scroll Chucks

The "Knight" Geared Scroll Chuck is substantially constructed by expert workmen, using high-grade materials, and is guaranteed to be commercially, mechanically perfect.

Sizes from 4 inch to 10½ inch.

Domestic and Export Trade Supplied.

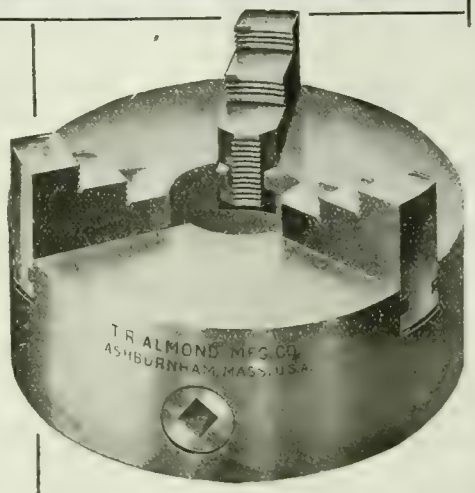


Knight Metal Products, Limited
119 Adelaide Street West - TORONTO, ONT.

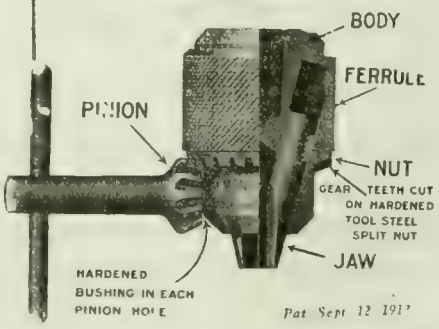
If any advertisement interests you, tear it out now and place with letters to be answered.

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



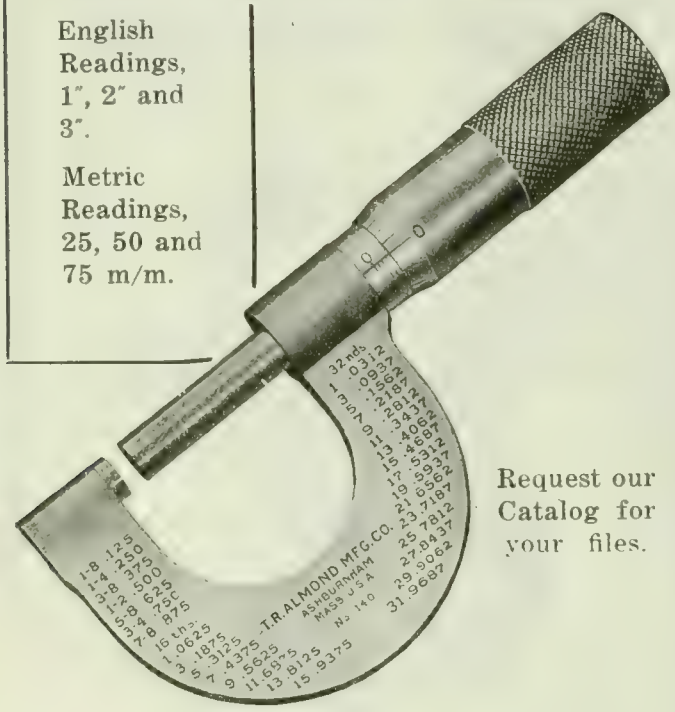
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

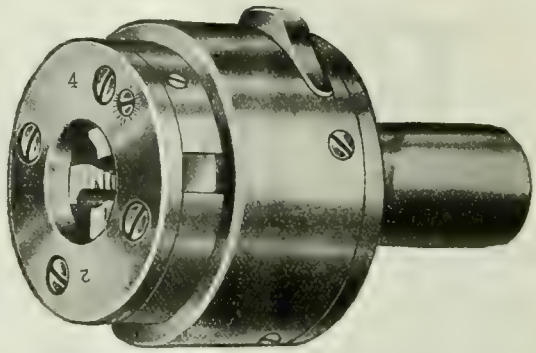
English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



Request our Catalog for your files.

T. R. ALMOND MFG. CO.
6 Maple Avenue, Ashburnham, Mass.



H & G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

Eastern Machine Screw Corp.
New Haven, Conn., U.S.A.

CUSHMAN

We've been Manufacturing

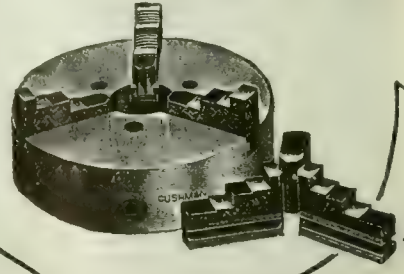
Nothing but Chucks and Their Accessories

FOR NEARLY 60 YEARS
AND OUR PRODUCTS SHOW IT

Years of experience in using our tools has convinced manufacturers that the word "Cushman" stamped upon a chuck is a guarantee of its quality and efficiency.

Let us send you our catalogue.

Cushman Chuck Co., Hartford, Conn., U.S.A.

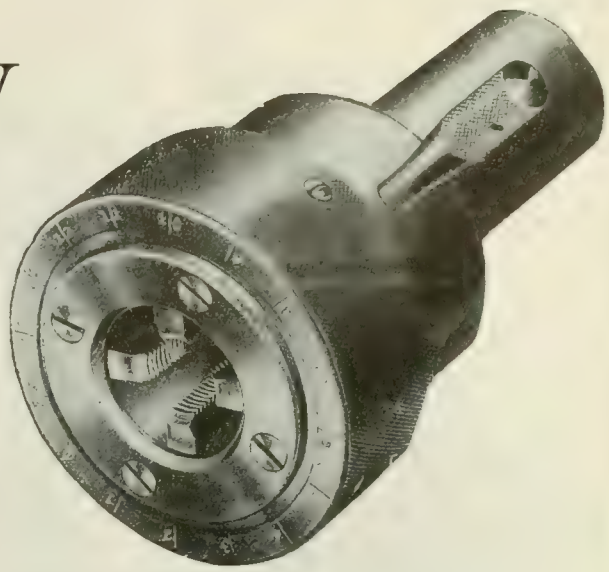


Rapid Delivery

Users of Murchey Tools Get Chasers Without Delay

Lightning deliveries—that is a big advantage of using Murchey Tools. No work held up for chasers. We get your order, fill it, and it's on the way back to you just as quickly as the most rapid means of transportation can bring it to you.

There is no service like the Murchey service, and there are no tools like the Murchey Tools. Send blueprints for estimates.



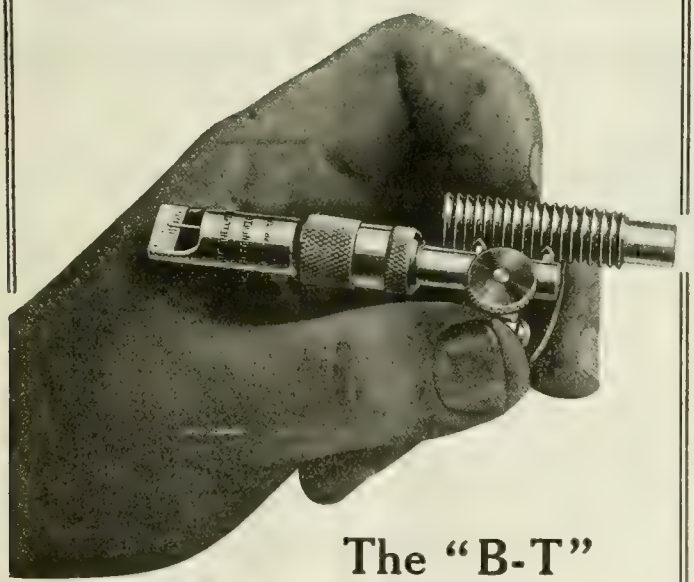
MURCHEY TAPS are accurate and simple and can be worked with great speed.

Murchey Machine & Tool Company

75 PORTER STREET - - DETROIT, MICHIGAN

The Coats Machine Tool Company, Ltd., Caxton House, Westminster, London, S.W., England, Glasgow, Newcastle-on-Tyne, and Fenwick Freres & Company, 15 Rue Fenelon, Paris, France.

Simple—Anyone Can Use It



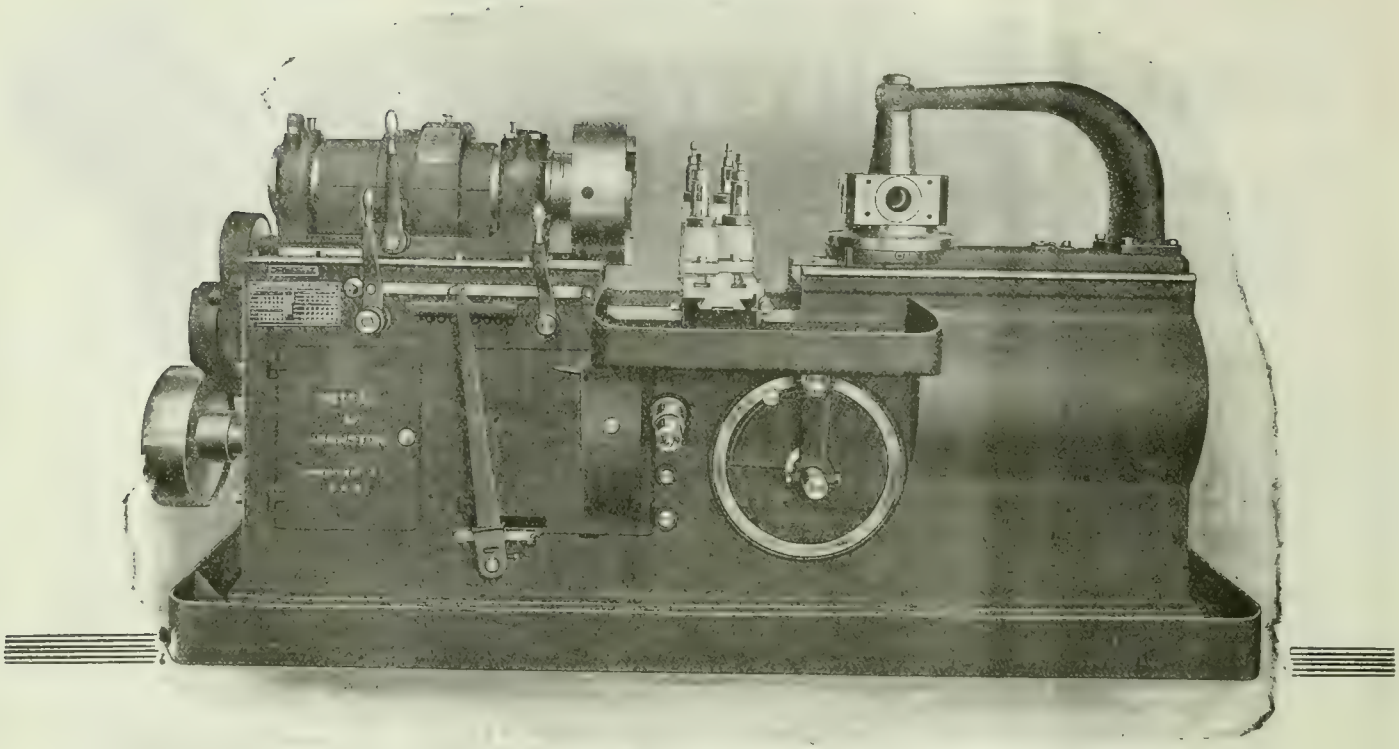
The "B-T" Thread Lead Indicator

A simple, practical and inexpensive appliance that indicates accuracy or inaccuracy of both internal and external threads. A check-up on set-up of machine, work, tap, etc.—a preventive against waste caused by non-fitting threaded pieces.

Get the details in the "B-T" Indicator Bulletin

Bicknell-Thomas Company, Greenfield, Mass.

If any advertisement interests you, tear it out now and place with letters to be answered.



6-A Potter & Johnston Automatic Chucking and Turning Machine

6-A Potter & Johnston Automatic Chucking and Turning Machine

Geared head, having three automatic changes of spindle speeds.
Geared feed.
Auxiliary reaming and threading feed.
Cross slide.
Automatic back facer bar through spindle.
16-inch convertible two and three-jaw scroll chuck.
Spindle 5¾ inches diameter, hole 3½ inches diameter.

Increased output means reduced cost, *both* are readily obtained on

Potter & Johnston Manufacturing Automatics

DO IT AUTOMATICALLY

All operations are entirely automatic. One attendant can readily run a battery of two to six machines.

In addition to automatically machining all varieties of castings from iron, bronze or steel, also forgings, the machines are also recommended and are widely used for finishing pieces from bar starch which have previously been cut off to length. This is a highly economical method of producing gear blanks, bushings, studs, etc.

Catalog gives full particulars. Drop a card for it.

Canadian Offices : POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office : 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse : Galt, Ont., Canada

Smalley General Thread Milling Machines

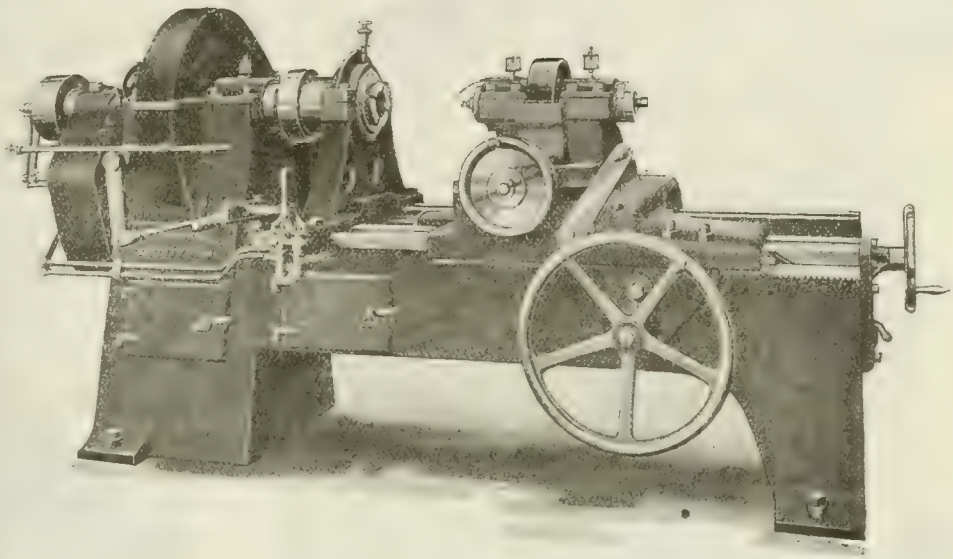
Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.

Write for Bulletin.



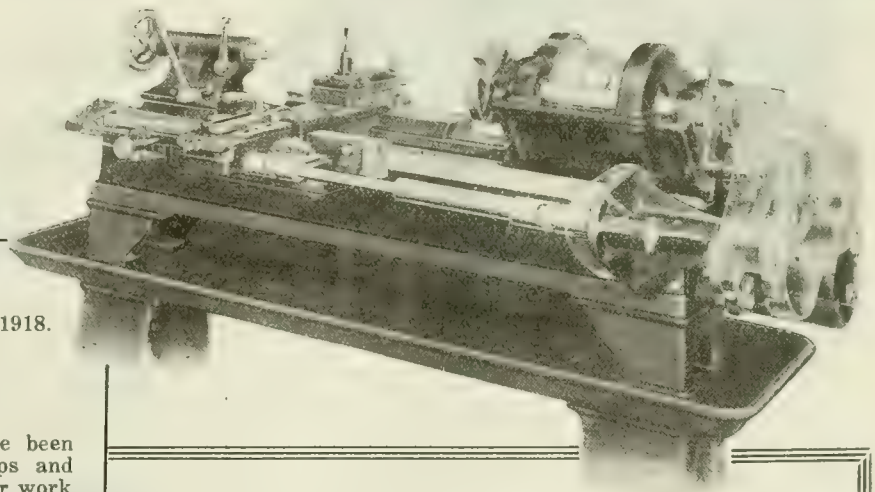
Smalley General Co., Inc.
BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
Montreal and Toronto

One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

READ THIS LETTER



B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th. 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

MULLINER QUICK CHANGE LATHE

The quick change mechanism gives 37 different threads and feeds
Another feature is the ring self-oiling system.
Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. Send for the full details of this ideal precision tool.

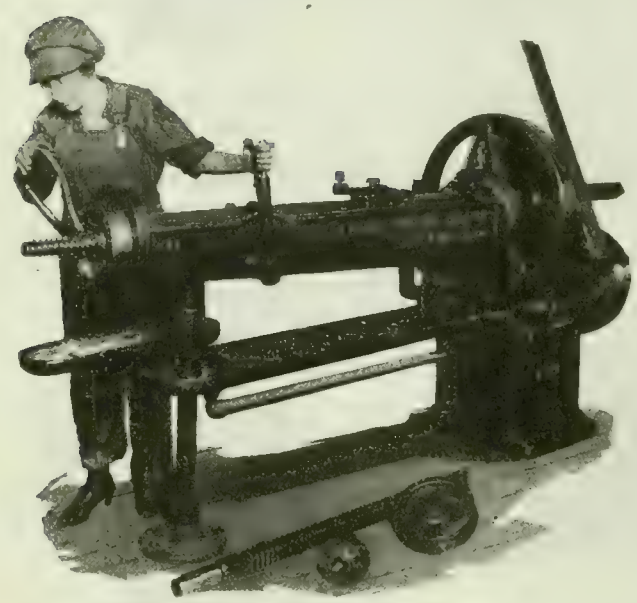
Mulliner-Enlund Tool Company
SYRACUSE, N.Y.

If any advertisement interests you, tear it out now and place with letters to be answered.

There is Always One Best Way

CUT GEARS

And with our large and varied equipment we can place YOUR job on the VERY BEST machine for its PARTICULAR requirements.



Broaching Square Holes in Tractor Transmission Gears.

Get our quotations.

Hamilton Gear & Machine Co.

Van Horne Street - TORONTO

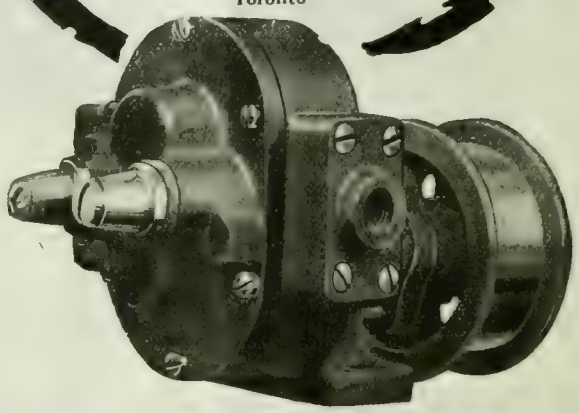
Machinery Maufacturers should equip their machines with

TRAHERN
Rotary Geared Pumps

They are easily attached and add to the attractiveness and value of the machine. Operate with equal efficiency and economy in water or oil. Automatic Relief Valve permits supply being cut off at discharge without stopping pump.

Get in touch with us about prices and samples

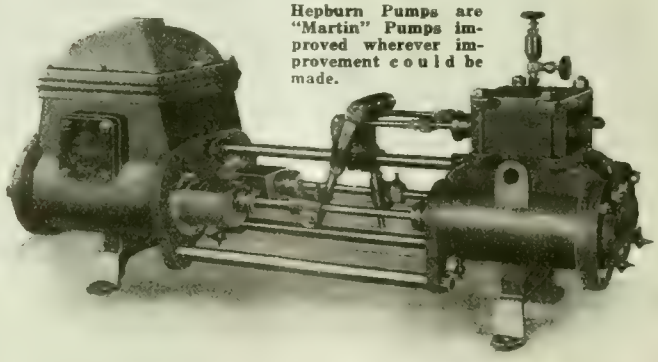
TRAHERN PUMP COMPANY
ROCKFORD, ILLINOIS
Canadian Agents:
A. R. Williams Machinery Co.
Toronto



Hepburn Pumping Machinery

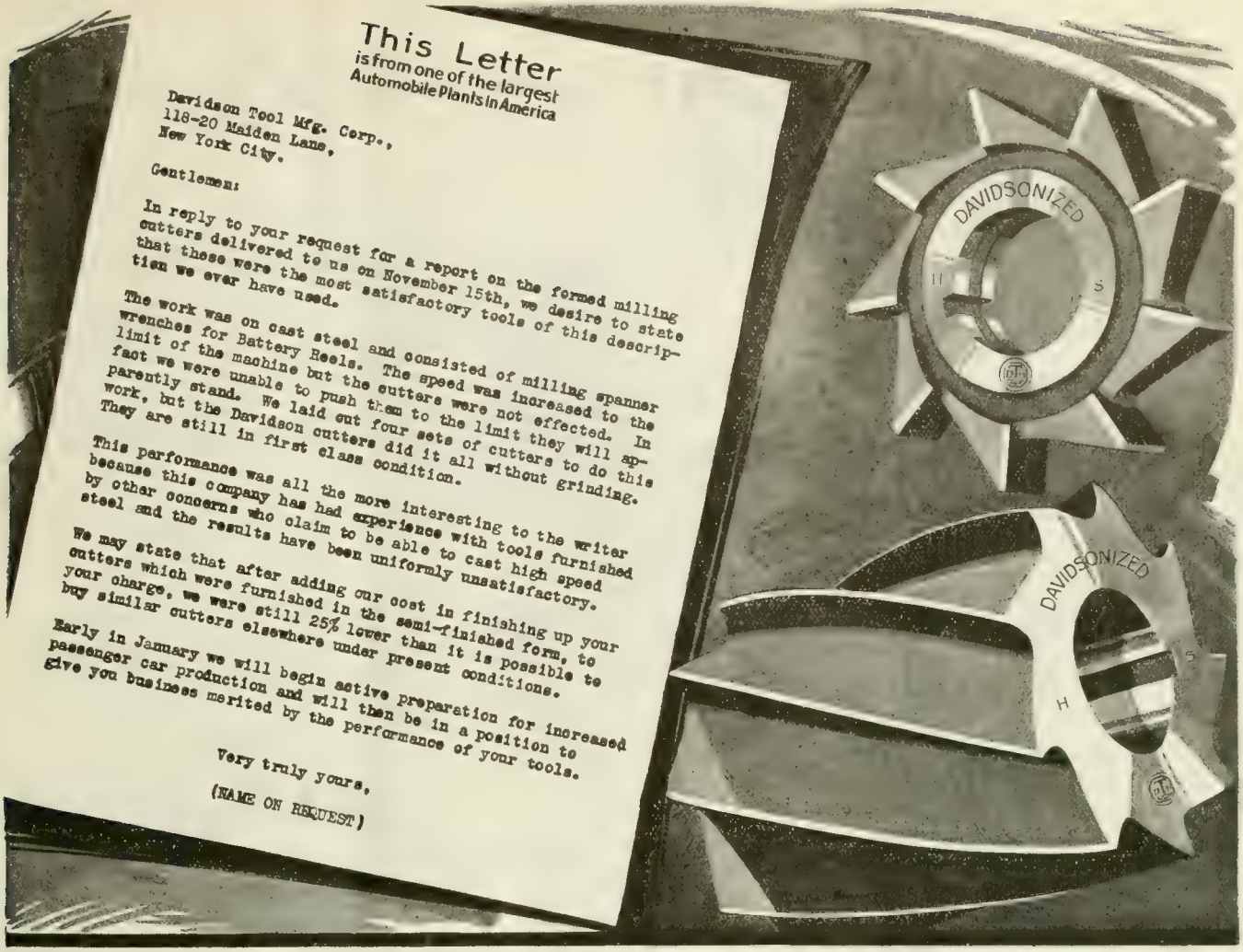
Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street Toronto, Ontario


This Letter
is from one of the largest
Automobile Plants in America
Davidson Tool Mfg. Corp.,
118-20 Maiden Lane,
New York City.
Gentlemen:
In reply to your request for a report on the formed milling cutters delivered to us on November 15th, we desire to state that these were the most satisfactory tools of this description we ever have used.
The work was on cast steel and consisted of milling spanner wrenches for Battery Reels. The speed was increased to the limit of the machine but the cutters were not effected. In fact we were unable to push them to the limit they will apparently stand. We laid out four sets of cutters to do this work, but the Davidson cutters did it all without grinding. They are still in first class condition.
This performance was all the more interesting to the writer because this company has had experience with tools furnished by other concerns who claim to be able to cast high speed steel and the results have been uniformly unsatisfactory.
We may state that after adding our cost in finishing up your cutters which were furnished in the semi-finished form, to your charge, we were still 25% lower than it is possible to buy similar cutters elsewhere under present conditions.
Early in January we will begin active preparation for increased passenger car production and will then be in a position to give you business merited by the performance of your tools.
Very truly yours,
(NAME ON REQUEST)
DAVIDSONIZED
DAVIDSONIZED

Cold Facts Convince Them All

300% Better Performance; 25% Saving in Tool Cost

Such a performance is beyond our guarantee and cannot be expected in every case. Yet we continually receive reports of similar remarkable records by

DAVIDSONIZED
High Speed Steel Tools

The biggest plants in the country are providing proof after proof of the increased production, longer service and tool-making economy which this remarkably advanced steel makes possible.

We guarantee any tool of Davidsonized High Speed Steel to give you at least 10% better service than any other tool you have been using on corresponding work. You will be the sole judge.

Such an increase, figuring factory overhead and labor, multiplies several times over the value of the tools.

Note our "Special Service" feature. It applies to standard tools, but is especially desirable for tools made to unusual shapes and other specifications.

Davidson "Special Service" costs you less than to bring your tools from the bar to the stage at which we furnish them. It eliminates loss by cracking in hardening. And it gives you **better** tools than you are now using, tools that increase production and last longer. Send us a trial order; you run no risk; our guarantee assures that. Correspondence invited.

SPECIAL SERVICE

We will supply Davidsonized Tools, semi-finished and easier to machine than any carbon tool steel, within approximately 1/64 of finish on face, 1/64 in bore and 1/32 in diameter, leaving only the final hardening and sharpening to be done in your tool room. A tool that takes 20 hours to make from the solid bar can easily be finished from a Davidsonized blank in about two hours. And we will guarantee our tools against breakage in hardening.

THE DAVIDSON TOOL MFG. CORPORATION

Main Office: 118-122 Maiden Lane, New York. Works: 56-62 North 6th St., Brooklyn, N.Y.

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

Halifax St. John Quebec Montreal Ottawa Toronto Hamilton Windsor Winnipeg Saskatoon Vancouver Victoria

Long Efficient Service

is insured by FAMOUS FIVE FILES.

The steel—the real basis of the file—is the best obtainable for this purpose, and we make well balanced files of the right cut and shape.

The right "cut" weight and shape of a file produces the best work and insures the longest efficient life for the file.

It pays to buy Famous Five—the line that provides such a wide range to select from.

Specify them when ordering.

They are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Made in Canada by

P H

TRADE MARK

WHY P.H. and IMPERIAL FILES?

Because they are made of the best file steel in America. All sizes and shapes are made of Best Crucible Cast Steel exclusively.

Because they are processed entirely by the most expert workmen in this highly specialized trade.

Because they are made in Canada by Canadian Capital and Canadian Labor.

and

Because

"They Cut Faster and Wear Longer."

Port Hope File Mfg. Co.

LIMITED

PORT HOPE - - ONTARIO

"ASK YOUR JOBBER"

IMPERIAL

TRADE MARK

Forgings and Steel Stampings

OUR Forge Plant compares very favorably in size with any on the Continent. Its efficiency is equal to that of any, and exceeds most. We can handle effectively practically any drop forging.

OUR Stamping Plants contain over 100 presses, including equipment to handle heaviest drawn work.

Dominion Forge & Stamping Co., Ltd.

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Wells
Universal
Grinder

Sharp Tools Defeat Sharp Competition

"Wells" Grinder will keep your tools bright

Send for Machine Tool Catalog No. 39C

GTD

Machine Tool Division

Greenfield Tap & Die Corporation

Greenfield, Massachusetts

Canadian Agents
Wells Bros. Company of Canada, Limited
Galt, Ontario

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 27A

The Importance of the Grinding Wheel in Knife Grinding

One of the most important factors in keeping the edges of high-speed steel knives in good condition and in preserving the life of the knives is the selection of grinding wheels of the correct grain and grade. Many of the common troubles, such as cracking and checking of the edges, may be avoided if the right wheel is properly used.

The grinding wheel should be of a grain and grade which will cut freely and rapidly with very little dressing and yet maintain its shape. The speed should not exceed 5,000 s.f.p.m. A wheel operated at too high a speed acts hard and develops the tendency toward glazing and dulling over.

On the modern knife grinding machines 2630 or 2636, grades J or K, Alundum vitrified wheels will be found almost universally satisfactory. Very little dressing is required, and a cool, rapid cutting action is given with a reasonable feed and traverse. Occasionally it is necessary to use wheels as soft as grade I or even H, but this is unusual.

On the old type of machine, where slower wheel speeds, and in most cases smaller wheels were used, 2646 J or K are successful. Here, too, softer wheels must sometimes be used, especially if the knives are particularly hard or the contact between the knife and the wheel is exceptionally broad because of a long bevel.

Moulding knives and others of a special design which are usually milled to original shape, are ground by hand to the required bevel on an ordinary bench grinding machine. For wheels ½" and thicker, 2636-M Alundum vitrified has been found successful. For wheels thinner than ½", 2646-M Alundum vitrified is most suitable. These moulding knives are afterwards jointed to the exact contour required by means of a master form which controls the movement of the jointing stone.

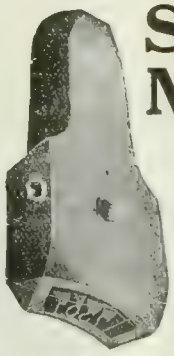
NORTON COMPANY

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS NIAGARA FALLS N. Y. CHIPPAWA, ONT. NEW YORK STORE 131 CHAMBERS ST. CHICAGO STORE 111 NO. JEFFERSON ST.

NORTON



Simplified Marking!

Canadian munition plants who have adopted Matthews Marking Tools find their marking operations simplified, done better and at a reduced cost.

MATTHEWS' Improved Champion Steel Holders and Interchangeable Grooved Type are designed to simplify and cut the cost of interchangeable marking. Strong spring attachment of holder and grooved type keep letters and figures secure and assure accurate, straight line work. MATTHEWS' line of marking tools meet all your requirements. Send for catalog.

Canadian Fairbanks-Morse Co., Ltd.
Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

Jas. H. Matthews & Co. - Pittsburgh, Pa.
Steel Lettering Dies and Stamps

Reg. U.S. Pat. Office.

"METALWOOD"

Hydraulic and Hydro-Pneumatic Quick Operating Presses for Straightening, Forcing and Broaching operations.

Hydraulic Accumulator Systems complete; Pumps, Valves, Forged Steel High Pressure Fittings, etc.

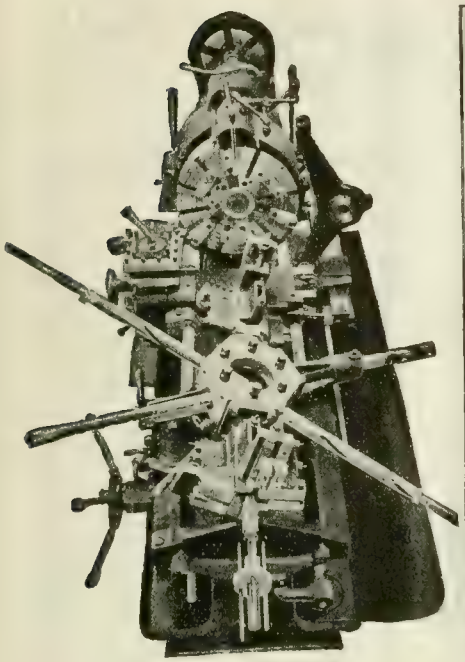
Metalwood Manufacturing Co.

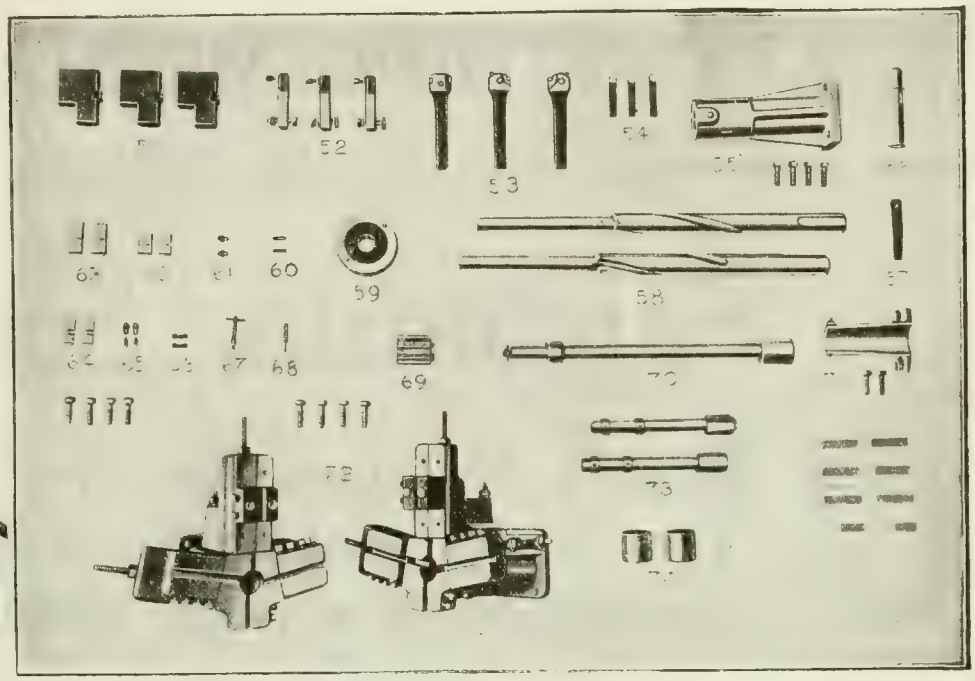
Detroit, Michigan

Sales Representatives

Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto; R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago; Fairbanks-Morse & Co., Inc., 30 Church St., New York City; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.

You wouldn't expect your auto to run without tires!





51—Three Hard Chuck Jaws
52—Three Chuck Jaws
53—Three Tool Holders
54—Three Tool Holder Tools
55—One Drill Holder
56—One Drill Socket
57—One Drill Drift Pin
58—Boring Bars Complete
59—One Chuck Bushing
60—Two Cutter Keys
61—Two Centering Screws
62—Two Solid Cutters
63—Two Solid Cutters
64—Two Expansion Cutters
65—Two Adjusting Screws and Adjustment Lock Screws
66—Expanding Cutter Shim
67—One Screw Driver Wrench
68—One Drift Pin
69—One Reamer
70—One Reamer Arbor
71—One Reamer Arbor Support
72—Two Facing Heads Complete
73—Two Supporting Arbors with Collars
74—Two Supporting Bushings
75—Eight Facing Head Cutters—blanks

Then give your Gisholt these Standard Chucking Tools

Equip a Gisholt Standard Turret Lathe with the proper tool equipment, and you have taken a step in the proper organization of turret lathe which makes your money invested more productive.

The simplicity of the tool equipment, as featured in the Standard Chucking Tools, shown on this page, eliminates to a large extent the necessity of special tools.

Let our Engineering Service Department determine your tooling requirements; explain the adjustment of tools and the range of work they do.

Gisholt Machine Co. - Madison, Wis., U.S.A.

Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

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EVERYTHING MECHANICAL

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The World's Standard for over 90 years---
The Scales that made weighing
accurate---For every weighing
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Our stocks are the largest in Canada

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CANADIAN MACHINERY AND MANUFACTURING NEWS

Volume XXI. No. 7. February 13, 1919

What Germany Exported to Canada in 1914

Lines That Figured in the Building Up of a Trade That Was Increasing Every Year—List Shows the Number of Firms in This Country Now Engaged in Making These Lines

(By T. M. Fraser, Ottawa Representative MacLean Papers)

THE last year for which we have trade statistics involving Germany s the year 1913; but in the case of Canada, as our fiscal year ends in March, we have Canadian importations from Germany for the trade year 1914.

The total exports of Germany in 1913 were nearly two billions and a half. In the year ending March 31st, 1914, Canada imported from Germany more than she did from France; in fact, Germany ranked third on our trading list, though the balance was much in her favor, as we imported $14,686,069, and exported $4,433,736. From Austria-Hungary we imported $1,787,473, and exported to her $378,824. Our total import trade with both countries was between sixteen and seventeen million dollars. This was cut off at a stroke when the war began, and we either had to produce the goods ourselves, or import from some friendly country. The bulk of this business went to the United States; but in the case of a considerable amount of it, the supply was produced in Canada.

As a matter of fact, when the war came, Germany was making rapid strides in the Canadian market. The history of our trade with her in recent years is interesting, because it involves a typical attempt on her part to bully Canada into compliance with her wishes—an attempt which was a pronounced failure.

In 1903, Germany denied the right of Canada to give a trade preference to the Mother Country, and attempted to penalize us by imposing maximum duties. Mr. Fielding clapped on the surtax, and cut German trade with Canada in two. In 1910, Germany cried "Kamerad," after a seven years' fight, in which the loss was practically all on her side, as we were importing manufactured goods from her, and selling wheat mainly in return, which was good in any market.

As a perusal of the list given below will show, practically all our imports from Germany were manufactured goods.

There are comparatively few articles on the list which we could not make in Canada. What we can do is shown in the matter of toys and dolls. Before the war almost all this came from Germany. There are now thirty-five concerns engaged in the business in Canada, and their product last year was estimated at 800,000 dollars. More than one-third of our toys and dolls are now home-made, the chief competitors being the United States and Japan.

In the Metal Markets

Importations of iron and steel goods from Germany amounted to nearly three million dollars. This is all now either being purchased at home, or coming from the United States or Great Britain. There are certain lines of small hardware in the making of which Germany excels; and German cutlery had begun to get a big hold in Canada, importations from that country being second to those from Great Britain and ahead of those from the United States.

We imported over two and a quarter million dollars' worth of woollens and other textiles, including over half a million dollars' worth of hosiery. In cottons, the importations were small—we are "some" cotton manufacturers ourselves. We imported nearly a million dollars' worth of drugs, dyes, and paints. Some of this stuff—particularly in dyes and drugs—we had to go without, or accept substitutes which, if not yet, "just as good," are fast becoming so. Some of the substitutes came from the United States, and some we produced ourselves. It would seem like carrying coals to Newcastle to import furs to Canada, but it is a fact that the year 1914 saw well on to seven hundred thousands dollars' worth come here from Germany. This was a needless trade, and is probably gone for ever.

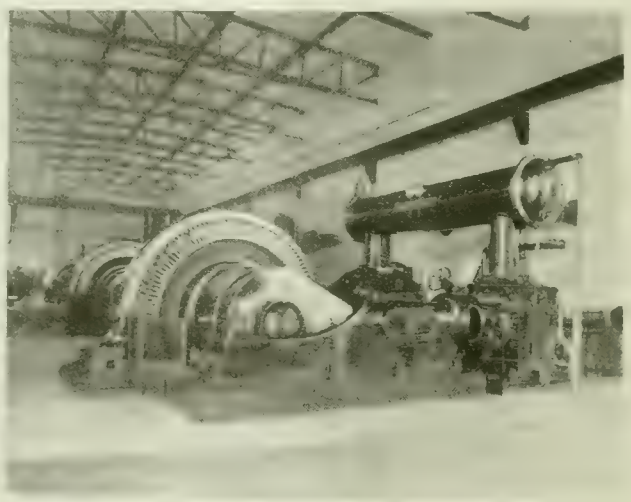
In 1914, our total importations of sugar and molasses amounted to over sixteen million dollars, including over one million dollars' worth of beet sugar from Germany. We got along without it, even if we did have to ration ourselves. Germany's loss will likely be the gain of the West Indies, or we shall get it from France if we must have beet sugar.

The following list covers the principal items imported from Germany and Austria in 1913-14, only those of which the gross importation exceeded ten thousand dollars being given. The number of firms engaged in the various lines is given in the belief that it is approximately correct, according to the best information we could secure:—

Canadian Importations From Germany

ARTICLE	Amt. imported in 1914		No. of firms mfg. in Canada now
Baskets, duty	$ 22,931		8
Books, etc.			
Calendars, show cards and other advertising matter	29,931		Very many
Labels, tags, etc., duty	35,884		Very many
Boots, shoes and slippers	25,658		About 120
Breadstuffs, duty	98,297		Very many
Brooms and brushes, duty	45,276		15 to 20
Buttons, duty	83,625		10
Clocks, movements, cases, time recorders, etc., duty	129,790		6 to 8
Cocoa and preparations, duty	80,675		8
Cotton—			
Clothing, etc., duty	400,740		18
Other clothing, duty	64,660		7 or 8
Printed, dyed or colored fabrics, duty,	88,987		
Velvets and plush, duty	33,073		1
Lace, duty	226,904	(1913	None
Sheets, quilts, tablecloths, napkins, etc., duty	31,717		1
Drugs—			
Acids, duty and free	25,152		
Alum, duty	22,001		None
Aniline and tar dyes, free	223,871		3
Glycerine, crude, free	59,577		6 or 7
Indigo, paste and ext., free	20,388		None
Medicinal preps., duty	59,512		12
*Potash, various forms, free	108,000		
*Sal ammoniac, free	14,834		
Tartaric and crystals, free	42,333		
Earthenware, duty	300,595		3
Electric apparatus, duty	204,388		About 30
Fancy goods—			
Embracing beads, boxes, braids, cases, feathers, toys, dolls, etc., duty	1,139,993		6 or 8
Flax, hemp, jute, etc., and mfrs. thereof, mainly, duty	70,385		20
Furs and mfrs. of, duty	441,123		40
Furs and mfrs. of, free	1,207,010	(1913)	40
Glass and mfrs., duty	276,221		
Gloves and mitts, duty	385,843		40
Glue, duty	38,380		8
Gunpowder, explosives, etc., duty	51,698		6
Gutta-percha, India rubber and mfrs. thereof, duty	96,895		
Gutta-percha, India rubber and mfrs. thereof, free	54,050		15
Hats, caps and bonnets, duty	72,173		20 or 30
Hats, caps and bonnets, free	48,057		20 or 30
Hides and skins, other than fur, free	176,641		Over 20
Hops, duty	63,413		1 or 2
Ivories, piano, free	93,553		None
Jewellery, duty	151,560		Over 30
Leather and mfrs. of, duty	60,691		Very many
Metals and minerals and mfrs. of—			
Brass, duty	71,336		Very many
Brass, free	59,053		Very many
Copper, duty	1,620		
Copper, free	50.586		10
Gold, silver, mfrs., duty	58,603		30
Iron, steel, mfrs. of, duty			Numerous
Angles, beams, axles and other shapes, duty	87,257		10
Bars, blanks, billets, etc., duty	85,991		10
Cutlery, duty	379,890		None except plated ware
Ferro-silicon, spiegeleisen, and ferro-mang., duty	194,999		3
Guns and other firearms, dty.	31,623		1
Machinery, cloth, duty	30,881		None
Machinery, printing, duty	22,700		None
Machinery, other, duty	241,193		30
Machinery, other, free	15,579		
Plate steel, duty	26,023		3
Pumps, duty	21,279		Very many
Skates, duty	42,886		3 or 4
Surgical instruments, free	42,981		None
Tires, steel, free	348,059		3
Tubing, wire, rods, etc., agate and other ware, free and duty	1,212,547		23
Tools and implements, duty.	66,724		Many
Zinc and mfrs. of, free	108,417		1
Misc. metals and mfrs. of, including aluminium, lights and fixtures, umbrella parts, etc., free and duty.	300,000		Many
Mineral and aerated waters, duty	38,122		Very many
Musical instruments, duty	177,991		30—chiefly pianos, organs
Musical instruments, free	12,485		
Optical instr., free and duty	200,000		None
Paints and colors, free and duty	200,000		25
Paper and mfrs. of, mainly, duty	350,000		Many
Pencils, duty	79,345		1
Perfumery, duty	28,445		10 or 12
Pocketbooks, purses, etc., dty	95,328		10
Silk and mfrs. of., duty	255,453		10
Sugar, molasses, etc., duty	1,001,716		8 or 9
Tobacco and mfrs. of, free	262,802		35
Pipes, etc., duty	24,120		1
Wood and mfrs. of, duty	51,558		Very many
Wool and mfrs. of—			
Carpets	69,827		5
Knitted goods	104,159		40
Clothing	150,000		Very many
Socks and stockings	55,000		20
Other clothing	155,949		Many
Fabrics, including various "fancy" cloths, mostly duty	425,000		20
Yarns, duty	57,646		6 or 8

*Firm entering this line now.



COMPRESSOR HOUSE, INTERNATIONAL NICKEL CO., COPPERCLIFFE, ONT.

Executive Common Sense in the Workshop

While Intended For the Plater the Following Article Contains Some Valuable Pointers Which Should be Carefully Considered in Other Departments as Well as the Plating and Polishing

By ABE WINTERS

STUDYING and working to increase our knowledge of the principles of electroplating, or striving to effect economies in the various operations necessary to the production of a finished product are very praiseworthy characteristics of the progressive foreman, but there are some other points which should receive attention, and at this time when the rush occasioned by the war has ceased and we can calmly devote more time and thought to the essentials of advancement the following compilation of common sense remarks may serve to help us greet the future with new ambitions and a keener realization of our respective duties toward reconstruction.

Before proceeding further, suppose we analyze the word progressive. Webster defines the word as "moving forward, advancing, improving; working for or endeavoring to secure advancement." A writer in "Forbes' Magazine" defines progressiveness as "looking forward intelligently, looking within critically, and moving on incessantly." In order to progress, the manager, superintendent or foreman of any industrial plant must give due consideration daily to these three essentials. Dr. H. A. Bruce says: "The most efficient manager is not the one who can drive men most vigorously. He is the one who can lead men most skillfully. Men are not cattle, though many managers handle them as if they were. They have rights which must be respected, and the best managers appreciate this. But if brutality is a serious defect in managers, egotism is a fatal one. The egotist never learns from his errors. Having marked out a course for himself, he persists in it, even though evidence rapidly masses to prove that he is on the way to disaster. Ability to keep on learning, ability to recognize mistakes and correct them, is assuredly magic in managerial efficiency. So is ability to select assistants wisely. This means that the manager must not only know talent when he sees it, but must be free from the defects of envy, which might prompt him to try to keep men of talent in obscurity. To know men, to respect the rights of men, to be able to develop in men the sentiment of loyalty, to keep in a learnable mood, to be willing and able to correct mistakes—such are a few of the attributes of the truly efficient manager."

This writer further refers to leadership as follows: "You must be an enthusiast, you must truly love your work, to become magnetic and to become a leader. Cultivate belief in yourself and cultivate intense interest in your work; energize yourself, energize your mind, and energize your body. How have the magnetic leaders of all generations energized themselves? By enthusiasm. They have set themselves certain tasks to accomplish, and have attacked enthusiastically. They have not gone at them in any half-hearted spirit. They have said to themselves, in effect: 'My work is the most important and the most delightful thing in the world. I want to do it just as well as I possibly can.' And because they have worked in this spirit they have found it possible not only to work well, but to do an amazing amount of work. Because they have been enthusiasts they have drawn others to them and have led others."

We are in possession of a circular letter which we understand was originally intended for the departmental heads of the Standard Oil Company. The ten rules therein presented will apply to the executives of practically all industrial plants, and form a very commendable list of common sense rules. The rules are given here with illustrative comments by present writer, and quotations from the works of H. A. Bruce and others.

"Rule 1.—Be fair, have no favorites and no scapegoats. A foreman has to act as judge many times every day; therefore he must be just."

Abraham Lincoln once remarked that "the length of a man's leg should be just long enough to reach from his body to the ground." Likewise the foreman's deductions after considering a problem or grievance should be just as concise and consistent as possible to make it. Teling a yarn to illustrate a verdict is not necessary. Be emphatic but courteous and unbiased by petty prejudices.

"Rule 2.—Make few promises and keep them. A foreman must be exact in this particular. Sometimes a foreman forgets that his job requires a high standard of truth and honor."

"Rule 3.—Don't waste anger—use it. Anger is valuable and should not be used carelessly. Keep your most forceful language for special occasions."

A foreman who indulges in profanity or harsh words while reproving an employee does not always obtain greater efficiency from the employee by so doing. Be strict, but be reasonable, and above all be certain you are right before you speak. Then be a man and hold your proper position with reference to the matter, do not try to smooth the affair over by childish familiarity, or failure to enforce the correct performance of the duty in question. If you do you will spoil the effect of the lesson previously given.

"Rule 4.—Always hear the other side. Never blame a workman until he has been given a chance to give his point of view."

Possibly you have failed to properly instruct the workman, perhaps he has not grasped the true meaning of an order or request. His intention may have been of the very best, and it is possible that the mistake may be the source of an improvement, and it may mean a ray of light on an old cobweb-covered idea—if your frame of mind will permit the light to enter.

"Rule 5.—Don't hold spite—forgive. When you have had to scold a worker, go to him later and show him his faults in a friendly way."

Some men will take a "calling down" and profit by it, others resent a stern reprimand and nurse the recollection of a trifling grievance until it assumes, in their estimation, very hideous proportions. Study the temperament of the employee as you come in contact with him daily, and if he is really worth while, exercise tact and common sense in training them for the duties you find them best suited for. Do not, under any circumstances hold spite toward a worker, such actions will decrease your self-respect, lessen your personal magnetism, and eventually change your whole aspect of life and your attitude toward mankind in general.

"Rule 6.—Never show discouragement. Never let yourself be beaten. A foreman must have perseverance and the 'never say die' spirit.

If it be a new finish, or a difficult casting you wish to produce, and things go wrong, don't let the men see that you are annoyed. Don't start smashing the fixtures or filling the atmosphere with spontaneous oratory with reference to something in the form of hard luck. "There's a reason" why you failed. Get it and set about your task cheerfully but with determination to win, and soon you will find you have grown to be a master of your work and a genius in the eyes of your fellow-workers.

"Rule 7.—Notice good work as well as bad. Let the workers see that you can appreciate as well as condemn."

Possibly you owe your present position to the fact that someone noticed your ability to do good work—very well, give the fellow who is following you the same consideration you found to be gratifying during your earlier experience. If you are worthy the position you occupy, whether it be as manager, superintendent, or foreman, you will not ignore the honest efforts of those who look to you for guidance in their daily routine of toil. Thousands of men and women have been changed from willing, obedient workers to indifferent drones or troublesome agitators as the indirect result of continued neglect in this regard on the part of some foreman or executive of greater authority.

"Rule 8.—Watch for special ability. Take a keen human interest in your

workers. Put each one where he can do his best."

Some men imagine that merely looking wise, while receiving instructions, will convince the foreman that they are interested and alert for pointers, but the fellow who really proves his wisdom is the one who thinks and acts in accordance with a well-defined purpose. Ideas are of no avail unless you use them. Do your work well to-day and it will not cause you worry tomorrow—are comments you may well remember. Our observations cause us to believe that the man who never makes a mistake does little else. Some men are natural-born expert slackers on any job. 'Tis said that a man named Dodgin was appointed foreman in a foundry; his name was not known to all the employees. One day, while on his rounds, he came upon two men sitting in a corner smoking, and stopped near them. "Who are you?" asked one of the smokers. "I'm Dodgin, the new foreman," he answered. "So are we," replied the smokers, "sit down and have a smoke." Nearly every factory to-day harbors one or more such creatures. Frequently they are troublesome cowards; sometimes inoffensive as far as speech, but always a bad example for the conscientious worker. He occupies a position which could either be done away with or which could be filled by a man worth while. Put the drones on piecework and the most then make good or vacate the premises. Possibly you have a man sweeping up who would make an ideal plater or molder if you trained him properly, and it might be to your advantage to make the change now.

"Rule 9.—Take your full share of the blame. This is the most difficult of all. The foreman who can share both blame and praise with his workers has discovered the secret of managing men."

In commercial electro-plating or polishing, as well as in general foundry practice, there are innumerable opportunities for the foreman to place the blame on an innocent worker and save himself, but the man who is guilty of such meanness is, indeed, a mean man. If the copper solution is unbalanced, or blistered deposits are common because you neglect the solutions, do not blame the operator. No doubt he has some horse-sense and could tell you a thing or two about your share in the cause of the trouble. Have you ever approached a workman who has been the innocent producer of inferior work, and in a friendly manner told him not to worry, the blame was on yourself because of your neglect or thoughtlessness with regard to certain duties governing his output? If you have never had occasion to do this, you are fortunate. If, on the other hand, you have had the opportunity and failed to use it, you have missed something. You have side-stepped a chance to prove your manliness. Try it and note the change in your influence over the men. If you are really big enough to be a manager, superintendent, or foreman, get up and lead your men, spineless "snobs" were never popular in executive positions.

"Rule 10.—Prevent accidents. Educate or eliminate the careless man. The good foreman is known by his men."

Accidents usually occur quickly and are very often serious. New men should be carefully instructed as to the character of the dangers in their way. Women should receive special attention and repeated reminders in order to avoid violation of given rules governing the operation of mechanical or electro-mechanical apparatus. In the polishing department extra care should be given the use of emery wheels, a careless worker may endanger the lives of several by using an unsound wheel or a stone out of balance. The skilful handling of the various articles during the operation of grinding, polishing, and buffing is essential to personal safety. Don't omit emphatic reference to "safety first" when instructing a novice.

Initiative

"Have you a clear idea of what initiative means? Quick thinking, intelligent planning, decisive acting, constitute initiative. Confronted in your daily work by unexpected problems, how do you react to them? Do you give alert thought to the devising of methods to get more satisfactory results, or are you content with accurately following directions given you? To be able to follow directions accurately is itself a good thing, but it is far better to be able to originate improvements. Then you are an initiator, not merely an imitator. Growth in power of initiative is largely, though not wholly, a matter of practice in constructive thinking. Study the work you now are doing with reference both to methods and to results. Ask yourself if there is not some way in which of your own accord you can effect improvements. Do not try to achieve too much at once. Be satisfied at first with working out a betterment in some detail, however small, then promptly act to realize that betterment. The expected improvement may turn out to be no improvement at all. Do not let that discourage you." With reference to employers, Dr. Bruce continues: "You have fallen into an unfortunate habit of railing and sneering at your employer; you describe him as arrogant, selfish, indifferent to your welfare, graspingly intent on grinding you down. Possibly he is all of these things. In that case I advise you to find another employer as quickly as you can. But you say all employers are alike. They differ only in degrees of greed or inhumanity. If that really is your belief, brother, I urge you to settle down and do some hard thinking. You are blinded by prejudice and class hatred; you are in a dangerous frame of mind, dangerous particularly to yourself. Shift the centre of your attention from your employer to your work, and the chances are you will work so much better that the employer you now criticize will give you more responsible duties at better pay. Unless your employer is a knave or a fool—and the average employer is neither a knave or a fool—he is bound to treat you fairly, if only from self-seeking motives. And appreciating that it is to his interest to safeguard your efficiency by safeguarding your health, he will see to it that your working place is sanitary, etc.

"Recent events with their insistence on maximum production have compelled increased attention to the subject of industrial fatigue. Improvements in ventilating devices have been shown to be greatly helpful in postponing industrial fatigue. Given a continuous supply of fresh air, workers have invariably increased and bettered their output. Experiments and observations have brought out clearly the direct relation that exist between the workers' attitude toward his work and the rapidity or slowness with which that work fatigues him. When means are taken to get the worker really interested in what he is doing even the hardest work becomes less tiring. When he is allowed to fall into a mood of indifference he tires more rapidly, no matter what the character of the work. The more that facts like these become generally known and applied the better will it be for employers of labor and for those employed by him.

The Bully

"Some day business men generally will awake to the fact that the bully is an unmitigated nuisance in industry—and more than a nuisance. He is a blight on the efficiency of any establishment in which he works. The evil-tongued and mean minded factatum functions as a human whif. He is never at a loss for a word that stings. Verbally he lashes those under him to ceaseless activity. All of which the employer may not merely tolerate but actually approve. Delusively he imagines that it is indispensible to speeding up and maintaining discipline. Yet as a matter of fact analysis always would show that it does more harm than good. Like worry—which indeed is often a direct product of bullying, it affects unfavorably the functioning of every bodily organ and process. It weakens the mental faculties necessary to good work. It hastens the coming of fatigue. Moreover, there is this fact which all employers will do well to remember: A man who bullies is always an inferior man. He has serious defects of which he is more or less conscious, and which he instinctively endeavors to cover up by lording it over those subordinate to him. Properly understood, therefore, his bullying is a confession of weakness. Of itself it is a danger signal to warn employers that the quicker they get rid of the bully—or persuade him to ascertain and overcome the cause of his bullying—the better it will be for their business interests."

Lunch Hour Jottings

The following notes were selected from many contained in the notebook of a successful foreman.

Gumption, grit and go are three good elements that most any man can acquire if he will only strive hard enough and long enough.

Many a good sample of plating is spoiled by a poor job of buffing, occas-

ionally poor plating is saved by skilful buffing.

The amount of work you get through a plating bath is one thing, and the way it looks or wears when you get it through is another, and often a more important consideration than the first.

Sometimes a foreman plater gets bossy just to show that he can, and at other times because an incompetent helper makes it necessary. In the latter case it might be a good idea to change the tactics and get a new helper.

Nothing has ever been plated so well it could not be done better, nor so badly that it might not have been worse. A poor suction system is better than none, but a good one is the best investment.

It takes a good man to prepare a perfectly efficient solution from a new formula when orders are piling up.

Have you ever stopped to think that maybe you are losing electric current through unseen small leaks? An electric leak through a steam coil may not attract as much attention as an overheated cleaning solution but it generally wastes more money in the long run.

A single drop of oil may ruin a whole batch of work. Men who are not well balanced are like machines that are not in balance—they make a lot of noise.

Continually complaining about a poor solution does not improve the deposit, nor the helper's attitude toward the condition.

Maybe the foreman can think better by sitting down in the factory, but it is not a good example to set for the others with thinking tendencies. If your thoughts weigh too heavily for you to stand up, go to the office and sit down.

It doesn't take a weak cleaning solution long to eat up in time the price of enough compound to make it splendidly efficient.

The giving of information creates a vacuum which tends to suck in more—if the intake isn't clogged by too much conceit.

Grinding and polishing lathes put in dark corners furnish very good settings for the display of sparks but there is little else in favor of such a location, while much could be said against it.

The man who repeatedly asks his employer for an increase in pay may get ahead quickest, but the man who is advanced without asking for it generally rises highest and stays longer.

Thomas A. Edison is credited with saying that real genius is made up of three parts inspiration and ninety-seven parts perspiration.

Your success may not depend so much upon what you can do yourself as upon what you can get the employees to do for you.

Spoiled work and an exhausted nickel solution are often found in the same tank.

It's all right to ride a hobby if you know where to get off.

Even some lazy men may get busy, but the trouble is they don't keep busy.

If you gave a little more attention to preventing waste of time and material, there would not be the need of so much effort to save the results of carelessness.

Sometimes a foreman plater has the making of a good shop superintendent in him but he rarely gets made.

The good appearance of electro-plated products is essential and the good appearance of an electro-plating department should be equally as essential.

Putting an overload on a dynamo is a good way to start trouble.

Remember there are two ways of working "as if you owned the shop," and the difference between them marks the distinction between the "officious" and the "efficient" man.

Doing poor work because it does not pay much is just what keeps thousands of young workers from getting on in any position. Small pay is no excuse for doing half work or slovenly work. The pay one receives should have nothing to do with the quality of his work. The work should be a matter of conscience. It is a question of character, not of remuneration. A person has no right to demoralize his own character by doing slovenly or poorly finished work simply because it does not pay much. The way one does his work enters into the very fibre of his character. It is a matter of conscience and no man can afford to sell himself because his salary is meagre.

Manufacturing the Whitlock Pony Press

Special Jigs and Fixtures Are Used Which Greatly Simplify Machining Operations on Parts of This Printing Press—Interesting Methods of Performing Operations Are Herein Shown

By ROBERT MAWSON

IN this article is illustrated some of the special jigs and fixtures used when machining elements for a printing press.

It will be noticed that the excellent practice is followed by using a previously machined surface for a locating medium in the jigs, the same locating point being used for all operations on any certain piece.

By this procedure chances of error are reduced to a minimum.

The fixture used for shaping a nut is of particular interest and the method can be followed in many shops to advantage.

This machine is manufactured by the Whitlock Printing Press Manufacturing Co. of Derby, Conn., and is of the two cylinder, two roller design.

One of the many patented features is the fountain, this being the only fountain on any cylinder press not bolted firmly to the frames of the press.

It can be tipped and set at any angle so that the ink cannot work away from the fountain roller, thus permitting color to run light. By means of its tipped position all the ink is used and waste prevented.

In Fig. 1 is shown the jig used when drilling the fountain feed lever.

The interesting feature of this tool is the method of location.

At the rear of the casting at A projects a long boss or shank which is turned in the lathe. In order to machine this concentrically the casting is swung on centres in the usual manner.

For this purpose a hole is drilled for the lathe centre A, the face on which the jig rests being also machined square with the pin. When the part is set up for the drilling operation this centering hole is utilized to align the jig, the first hole A being placed in line with it.

The two set screws B are then tightened and 13 ⅜ in. holes are drilled in the lever casting.

Drilling Fountain Feed Disc

The jig used when drilling the fountain feed disc or fly crank is shown in Fig 2.

This is a plain disc machined all over with a hole boxed in the centre.

The jig is located by a plug which fits into this bored hole.

A ¾ in. hole is then spot drilled and reamed through the bushing A. In the piece however there is a set screw which must be at an angle of 90 deg. with this reamed hole.

An index finger B is therefore attached to the jig as shown.

After the operator has machined the reamed hole he scribes a line guided by this finger and as this is the required angle the correct location for the set screw is obtained.

The hole is then drilled and tapped in a later operation.

On the press there are two front brackets, one on the gear and the other on the feeder side.

The jig used for drilling these elements is shown in Fig 3.

The casting has been machined on the base and sides of the boss in a previous operation.

The casting is located against a pin

in contact with which the side of the base is pushed.

Three straps A and B then hold it securely in position.

The straps A and C are utilized when machining the opposite hand of casting. Two ½ in. holes are drilled and one ⅜ in. spot drilled and reamed are machined in each casting with this jig.

The two upper bushings are used for both hands, the boss being the part which is offset from the base.

Drilling the Gripper Stand

When drilling the gripper stand the jig shown in Fig. 4 is used.

The casting has had the various bosses and base machined in a previous operation.

The piece is located against the adjustable set screw A, the base resting on the jig at B.

The two straps shown being tightened holds the piece securely in the jig. The jig is then turned to rest with the face C on the machine table and the following holes machined:

Four ½ in. drilled, two ¾ in. spot drilled and reamed, one 1 in. spot drilled and reamed, two 15-16 in. spot drilled and reamed, two ½ in. spot drilled and reamed, and one ⅜ in. spot drilled and reamed.

The same jig is used to machine the Reel stand, but as this is the opposite hand the casting is located in a similar manner on the reverse side of the centre web of the tool, the same bushings however being utilized to guide the various drills and reamers.

In Fig. 5 is shown the jig used when drilling the air release valve body. The casting is placed on a turned register, which fits inside the bored hole of the piece.

It is located by pushing the arm A against the adjustable set screw B by means of the thumb screw C and is held with two straps. Three ⅜ in. holes are then drilled.

The purpose of the hole D is to enable the operator to place a pin through and by pushing against the valve body remove it from the jig should it be found that the registering projection fits tightly into the piece.

An Interesting Shaping Fixture.

The illustration Fig. 6 shows a special fixture designed for machining the vibrator bushing. This operation is performed on a shaper. The fixture is provided with tongues which fit into the machine table and a bolt at A holds it securely.

The casting, one of these being shown at B, is bored and the ends faced on a lathe in a previous operation.

The piece is then placed on the spindle C as shown, the fixture being in position on the shaper table.

The travel of the tool is adjusted so that it will travel past both edges of the piece in the usual manner.

The crank D, which turns a worm under the index worm wheel E, is then operated until the surface F is horizontal. The table travel is then thrown in and the shaper being started the operator machines the horizontal surface of the bushing.

As soon as the tool reaches the circular part the table travel is thrown out and the operator feeds the casting around by means of the crank, revolving the worm wheel until the index pin G reaches an index line marked on the dial which coincides with the arc of the radius to be machined.

The table travel is then again put in contact and the opposite horizontal surface is machined.

It can easily be seen that such a fixture and method could be used for machining other circular shapes than the one it was designed and used for.

In Fig. 7 is shown the jig used when machining the ductor cam lever.

The casting is located in the tool by being pushed back into the vee at A.

Owing to the peculiar shape of this piece the plate B must be swung out of line to permit the insertion of the casting in the jig.

The other end of the casting is located against an adjustable screw at C, being forced against it with the thumbscrew D.

The following holes are then machined: one ⅞ in. drilled, one ⅝ in. drilled, and one ¾ in. drilled.

Machining the Feed Guide Stands

The jig shown in Fig. 8 is used when machining the feed guide stands, one on the feeder and the other on the gear side. For this purpose the tool is made of a double angle section, one face of the centre web being used as a locating surface for one hand and the other face for the opposite hand.

The base of the casting and face of the various bosses have been machined

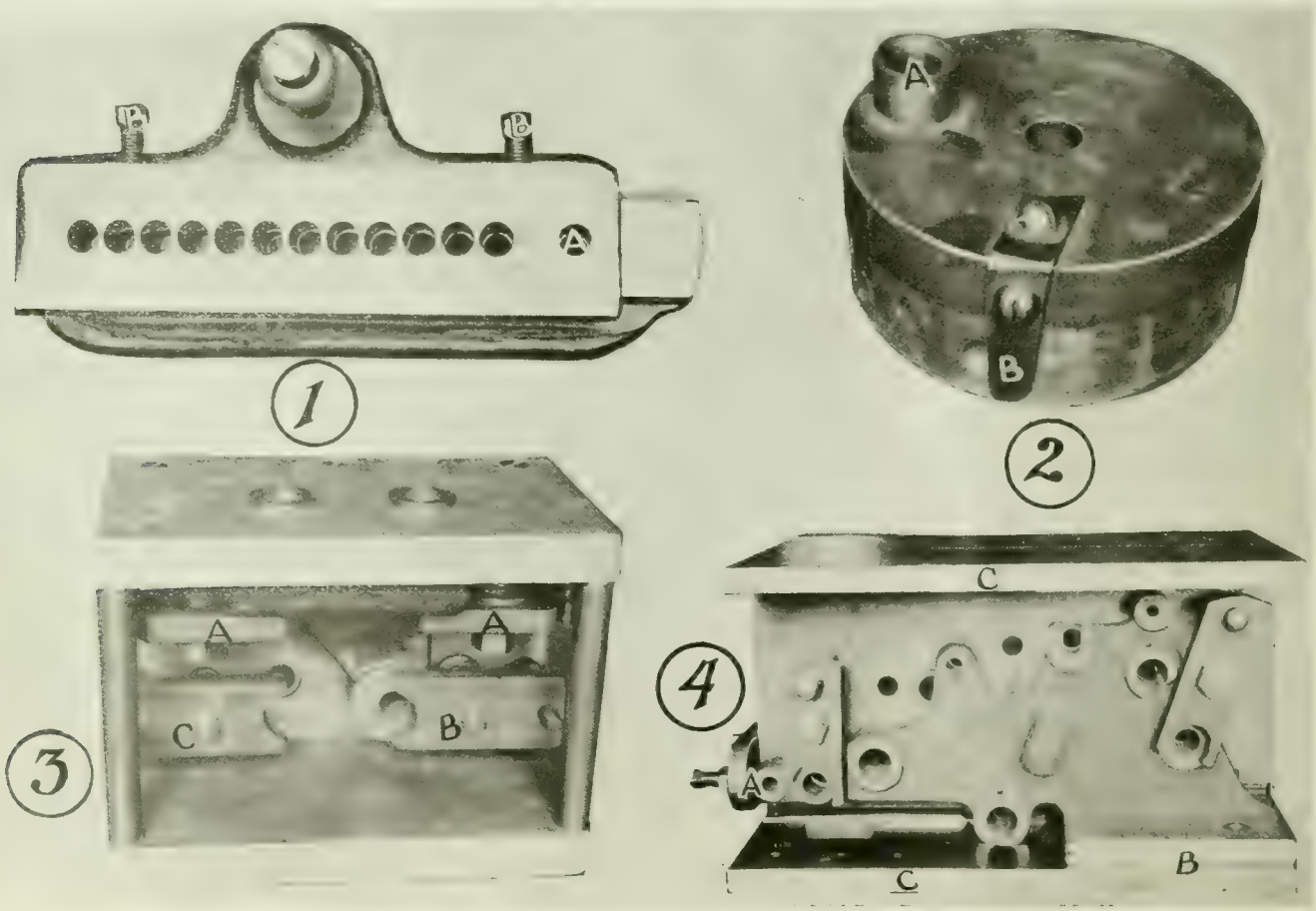


FIG. 1 JIG FOR FOUNTAIN PAD LEVER. FIG. 2 - JIG FOR FOUNTAIN FEED DISC. FIG. 3 DRILLING THE FRONT BRACKET. FIG. 4—JIG FOR DRILLING GRIPPER STAND.

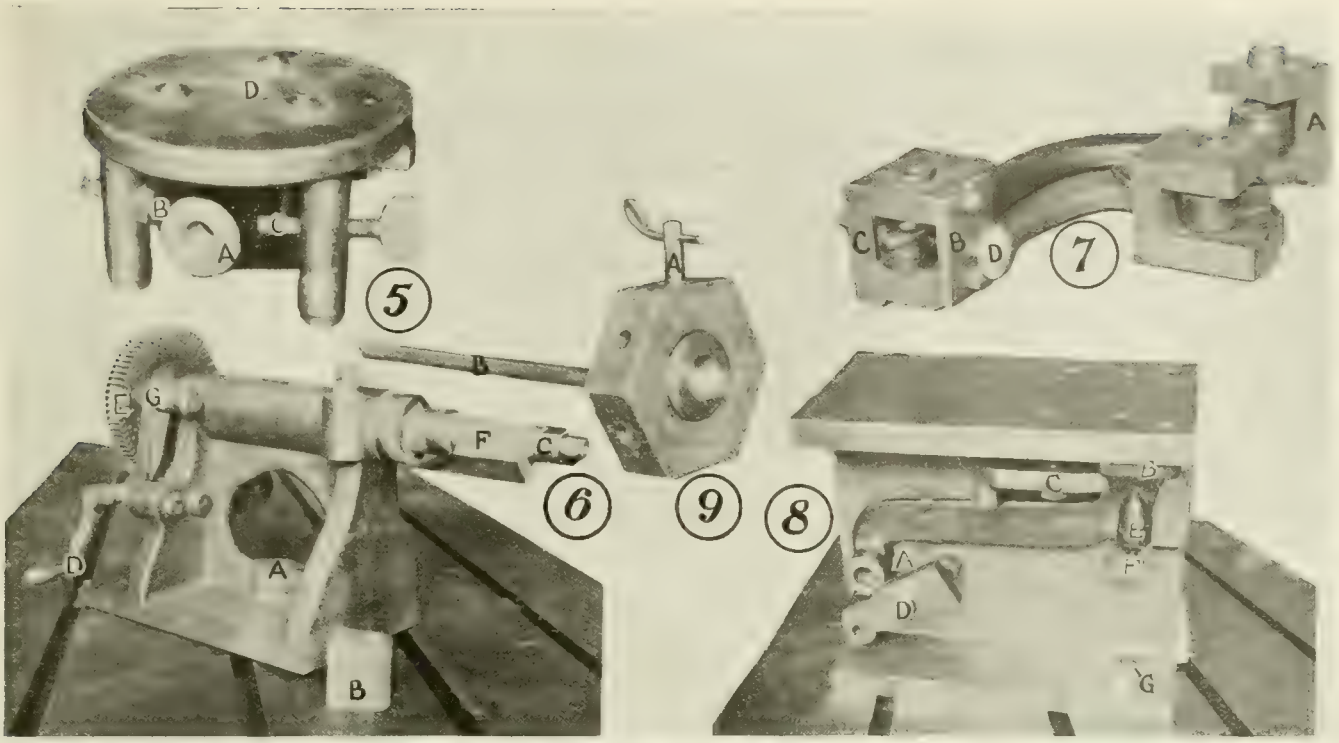


FIG. 5 DRILLING AIR RELEASE VALVE BODY. FIG. 6 SHAPING THE VIBRATOR BUSHING CAM LEVER. FIG. 8—MACHINING THE FEED GUIDE. FIG. 9— JIG FOR LIFTER ROD NUT FIG. 7 JIG FOR DIRECTOR

in a previous operation. The casting is located by the pin A and held against the surface B with the strap C, the other end of the casting being held with the strap D.

Two ⅜ in. holes and one ¾ in. hole are drilled, and one, ⅞ in. hole spot drilled and reamed. A hole is also drilled in the boss E to suit a ½ in. x 13 in. thread, the drill being guided through a bushing in the plate F, but a special long drill must be used as it has to pass through the hole G in the wall of the jig.

A somewhat simple type of jig is used for drilling the lifter rod nut and is illustrated in Fig. 9.

The nut is machined all over before being drilled and is slid in from the end of the jig until its face comes flush with that of the tool as shown.

A ⅜ in. hole is then drilled in the piece, the drill being guided through any convenient bushing. The pin A is then placed through the bushing into the machined hole, thus holding the part in alignment and from moving; five other ⅜ in. holes are then drilled in the piece.

An interesting feature of the tool is the handle B, which enables the operator to manipulate the tool easily around on the various faces during the drilling operation.

Machining the Form Stand

When machining the form stand the casting is first faced on the base, and a rectangular slot machined at the upper end.

The casting is then placed in the jig Fig. 10 and is located by means of a block A, which fits into the machined slot.

The screw B is then tightened which forces the casting down until it rests on its base. The two straps C hold the part securely in the jig.

The following holes are then spot drilled and reamed: one ⅝ in. at D, one 1¼ in. at E, one 15-16 in. at F, one ¾ in. at G and two ½ in. in the base H

The slip bushing used to guide the reamer is then removed and as the fixed bushing has been made sufficiently large for the diameter of the bosses, these are faced in the jig, one side with an ordinary facing tool and the rear face using a draw-back facing tool.

It will be seen that the jig must be turned over three different times when machining this piece, one of these being at an angle as shown.

However this jig as well as the other tools described are giving the best results in service and the design and methods can be followed to advantage by any shop desiring accurate and intensive production.

TUNGSTEN STEELS

By M. A.

In spite of all the work which has been done on the tungsten steels a considerable amount of divergence of opinion still exists regarding their constitution. A research recently made in certain special steels, in particular perhaps those containing tungsten of chromium, the temperature at which the carbon change occurs on cooling (A2, 1) is lowered to a very considerable extent when the temperature from which the steel was cooled exceeds a certain minimum. Further, such steels, when heated, pass more or less gradually into that condition which, after quenching, produces the greatest hardness. In plain carbon steels such changes occur sharply at a definite temperature of 730 deg. C. The changes of constitution which bring about these abnormalities are susceptible of a ready explanation in terms of this research, of which the following is an abstract:

The constituents which may be found in tungsten steels are iron, cementite, (Fe_3C.), tungsten carbide (W.C.), iron tungstide (Fe_2W), and a double carbide whose formula is stated to be 4 Fe 3 C., W.C. Of these, tungsten carbide and iron tungstide are non-magnetic This lowering of the recalescence point is a maximum, when 9 per cent. or more of tungsten is present and is independent of the carbon in the steel.

During cooling down it is very difficult to bring about the recombination of the carbide to form the double carbide, since tungsten carbide is only reformed slowly. If, however, the steel is reheated to 800 deg. C. and cooled normally, the initial structure is reproduced. It was noted that boiling sodium picrate blackens Fe_2W., as well as Fe_3C. The fact has probably produced much confusion hitherto when blackened material has been taken from cementite.

These changes in structure do produce marked changes in the properties of the steels, especially perhaps magnetically. It would appear that the special qualities of tungsten steel for magnets are to be attributed largely to the double carbide. If such a steel is quenched from too high a temperature—and it may be noted that the quenching temperature actually used is that which will give a maximum of the double carbide—the magnet is unsatisfactory. The fact may now be readily explained since the treatment tends to split up the double carbide, and by inter-action with iron to eliminate it, producing in its stead the ordinary carbide of plain steels and the non-magnetic carbide of tungsten.

Cast Iron in Bending; Variation in Beam Strength

In a Series of Tests on Cast Iron Shapes, the Author Brings to Light Some Interesting Facts Relating to the Effect of Varying Cross Section Upon the Strength of Beams in Bending

By J. HARLAND BILLINGS

MOST mechanical men will remember what a feeling of proud attainment was theirs when, in the progress of their acquaintance with mechanics, they became masters of the equation for the strength of a beam and were able to compute the bending load that a shaft or beam of any shape of cross-section could carry. With the faith that the youthful mind always has in mathematical results, the old equation connecting the bending moment with the moment of inertia of the section and the fibre strength of the material was taken as a statement of infallible truth, and little thought was given to the possibility of some unruly beams performing otherwise. Even amongst experienced designers the opinion seems to be general, that, while the above formula may not be exact for some materials, especially cast iron, it is near enough for practical purposes. They are surprised to learn that in certain cases it is as much as 100 per cent. in error.

The Beam Formula

The beam formula may be written—

$$Mb = \frac{I}{c} ft$$

where, if all units are pounds and inches, Mb is the bending moment caused by the load.

I = the moment of inertia of the section.

c = the distance from the neutral axis to the maximum stressed fibre in tension.

ft = the tensile fibre stress in such maximum stressed fibre.

For the beam of rectangular section (Fig. 1).

Mb would be $\frac{WS}{4}$ at the centre section,

I would be $\frac{bh^3}{12}$ and c $\frac{h}{2}$.

Now, suppose the beam in Fig. 1 were an ordinary gray iron casting. If we wished to obtain the ultimate strength in tension we would break the piece, or a specimen of similar material, in a tension testing machine, and the result would be about 24,000 lbs. per sq. in. If it were broken as a beam, however, and the ultimate fibre stress computed from the beam formula, ft would be about 37,000 lbs. per sq. in.

From this surprising result several facts become apparent. First, (ft) in the beam formula cannot be a fibre stress at all, for there can be no change in the actual fibre strength of the material, whether the piece is broken in tension or bending. Secondly, it is plain that there is some cause or causes tending in this case to strengthen the beam against bending that are not taken account of in the beam equation. If we change the beam equation to

$$Mb = \frac{I}{c} ft\ R$$

Calling R the "rupture factor," and if we define ft as the true unit tensile strength of the material, R then becomes a factor which represents the difference arising from any causes whatsoever, between the practical performance of a beam and what might be expected according to the original beam formula. For any particular case, that is a particular material and a particular shape and size of cross-section, the value of the rupture factor can be determined only by experiment, and its value must be known before a beam of such material and section can be intelligently designed.

Experimental Results

The determination of this rupture factor for cast iron beams of various cross-section was the object of a research in the Department of Mechanical Engineering, University of Toronto, recently, and the principal results are given in Table 1. Very little work has previously been done on this problem and the results which were available were unusually conflicting. Each result in the table represents the average of a number of results, derived from the breaking of test beams, which were cast especially for this research. Over 1,400 lbs. of castings, comprising about 90 specimens, were used.

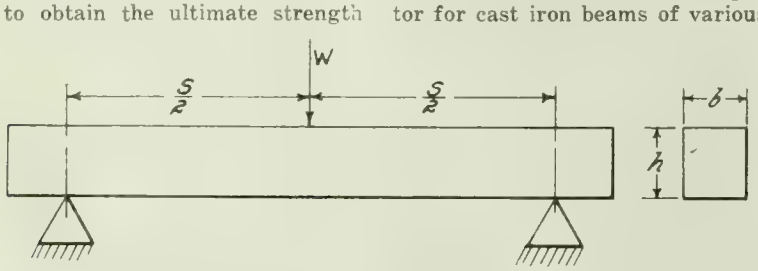


FIG. 1—ARRANGEMENT OF TEST APPARATUS.

Section No in Fig 2	1	2	3	4	5	6	7	8
Section	Square	Round	Narrow Plate	Wide Plate	Medium Rectang	High Rectang	Uniform I	Special I
Rupture Factor	1·64	2·10	1·55	1·46	1·43	1·42	1·22	1·03
Economy Factor Ft lbs. per Sq in	652	629	620	583	1140	1700	2230	2300
Pure tensile strength of metal used = 23000 lbs per sq. in.								

TABLE I

The Sections Investigated

The numbers in the first line of Table 1 refer to the sections used, which are shown dimensioned in Fig. 2. These are taken to be fairly representative of the sections most used in practice. Nos. 4, 6, 7 and 8 have the same area, so that comparison is simplified. All except the "I" sections have the same wall thickness, the object being to eliminate, as a factor in the results, the variations caused in cast iron by the difference in cooling rates between thick and thin sections. The 1¼-inch section used is the thickness of the "Arbitration Bar" of the Am. Soc. Testing Materials, which has come to be adopted as standard on this continent. No. 7 is the uniform "I" section commonly used, and No. 8 illustrates the section often seen, where an attempt is made to utilize the fact that cast iron is four times as strong in compression as in tension. The thick side should in all cases be the tension side.

The Quality of the Castings

It was of essential importance that the quality of metal in all specimens should be the same in order that the results should be independent of this variable. To ensure the required uniformity all the molds were poured from a single kettle of metal, and that run from a unit charge in the cupola.

The chemical analysis of samples showed a satisfactory uniformity. The average analysis gave:

C	Mn	S	Ph	Si
3.32	.49	.090	.687	.2.34

The Rupture Factor

In the expression $Mb = \frac{I}{c} ft\ R$, the values of I and c come directly from the dimensions of the specimen. The pure

tensile strength ft was carefully determined from tensile specimens poured from the same kettle as the bending specimens. The breaking load registered on the testing machine and the open span used give the value of Mb. The rupture factor could then be computed. From the results it will be seen that the values of rupture factor for all the rectangular sections group around 1.5, while for the others there is a wide variation.

The Economy Factor

The values given under "economy factor" in table 1 are got by dividing the maximum bending moment in ft. lbs. by the cross-sectional area in sq. in. It therefore expresses the relation between carrying capacity and weight of the specimen, and is a true measure of the efficiency of the beam.

It will be seen from the table that, although the "I" sections have the lowest rupture factor, they are still the most efficient beams by a large margin. Again, the special "I" has about the same efficiency as the uniform "I", although the latter has 22 per cent. larger rupture factor. This might be taken to indicate that there is little to be gained by thickening the compression side of fibres nearer the neutral axis take more than their proportional share of the stress. This fact, however, will not account for one-tenth of the variation in the case of the round section.

Another factor is the presence of inferior metal at the core of a casting and denser, stronger metal at the surface. This helps very little, however, in explaining the variation between the round and square sections.

The problem is a very interesting one, and it is evident, both from these results and from the conflicting opinions to be found in the literature on the subject, that much remains to be found out as to what actually takes place in a beam when it is bent. More research along this line is to be expected.

The following constants are recommended for use in design:—

Shape of Section	Rupture Factor
Rectangular	1.5
Round	2
Uniform I	1.2
Non-uniform I	1

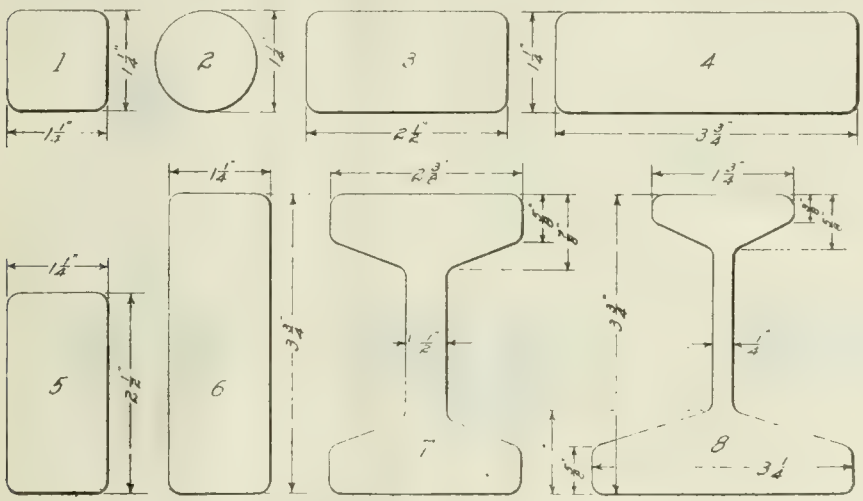


FIG. 2 CROSS-SECTIONS USED IN EXPERIMENTS.

such a section. In the writer's opinion, however, the only safe conclusion is that extremely non-uniform sections are not advisable. It would probably be found that a section somewhere between the two would be most efficient.

Possible Reasons for Results Obtained

The deviation of the rupture factor from unity is the measure of the deviation of the actual strength of a beam from the theoretical strength, as computed from the beam formula. What are the causes of this deviation?

First, the beam formula is based on the assumption that the stress increases uniformly from zero at the neutral axis to a maximum at the outside fibre. We know this is not exactly true, for the stress-strain curve for cast iron is never a straight line. It is concave to the axis of strain, which means that the

ROPE AND TACKLE

Ropes are so frequently used that everyone should be thoroughly acquainted with their proper selection, care and employment. In using a single and double block or two double blocks taking a ¾ inch rope, the rope should be of good length, especially if the blocks are double and triple. Such a tackle may be used to lift timber to place or in putting up timber frames and trusses and in hauling up rafters. In hauling a heavy object on the ground the tackle should be so fitted up that the rope which is pulled runs from the object to be moved and not towards it. Ropes which have a woolly appearance, or where the ends of the fibre protrude, should not be used for important work. All ropes should be protected from dampness. Ropes are frequently allowed to unravel at the ends and thus become shorter. If a piece of twine is wrapped round it this might easily be avoided. When a rope runs over a pulley it is constantly bending and straightening, causing the fibres to chafe at the centres. The smaller the pulleys the worse it is. A pulley should not be less than eight times as large in diameter as the rope, and a larger one would be better. Ropes used in tackles or pulleys will give more service if they are reversed occasionally. For such important work as hoisting tackles it is better to use a four-strand woven around a cord. This costs more than than the three-strand, but is worth more.

Knots weaken a rope; the more bends there are, and the shorter they are, the worse.

One principle of a knot is that no two parts that would move in the same direction if the ropes were to slip should lie alongside each other. Another is that a knot must be so devised that the tight part of the rope will bear on the free end in such a manner as to pinch and hold it.

To untie a hard knot in a rope or strap, hammer it on all sides with a piece of wood, then dip it in boiling water for a moment or two. A little soap will help. With a sharp-pointed instrument the knot may then be picked loose.

To remove a snarl in a rope, draw out one end as far as possible, then open the centre of the snarl so it can form a hole round this free end, and seize the entire bundle, forcing it through this hole, putting the outside first; this will add to the free ropes, and if continued will unravel any tangle.

TURBINE FAILURES

The increasing dimensions of turbines in large generating stations is a feature of modern power development affecting a high thermal efficiency and a marked saving of fuel. One disadvantage, however, is the increased responsibility centred in a single machine, and this at once demands that special care should be given to every detail in its construction in order to avoid any possibility of breakdown. A notable mishap occurred recently to a 35,000 kw. horizontal single cylinder steam turbine at O Station of Boston Elevated Electric Railway, resulting in the complete wreck of the big machine. This appeared to be due to the fact that a machine at another station dropped a load of 27,500 kw. and in attempting to take the whole of this load, all the diaphragms and wheels, together with the blades from the 17th to the 20th stage (low pressure) were wrecked and carried away. The estimated direct loss is of the order of £40,000 and serves to emphasize the necessity for the utmost care in the design and construction of every detail of such large machines. Additional means of inspection, too, should be provided, in order to detect irregularities, as, in this case, evidence of irregular working was apparent at least six minutes before the destruction of the machine took place. Stops should also be taken to allow of the rapid stoppage of machines in which such irregularities are detected.—M. A.

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

COLD DRAWN STEEL WORK

By M. H. POTTER

FIG. 1 shows the drawn casing after the threads have been machined and the casing trimmed to length, the operation being performed on a turret lathe on hand-screw machine.

Fig. 2 shows the blank, as produced by the blanking die shown in Fig. 3. The blanking die requires little explanation, A being the punch, B the material in strip form, and C the locating stop, D the two set screws for locating, E the guide.

Fig. 4 represents the first drawing operation, being performed as shown in Fig. 5. As is the blank, B the self-adjusting die, C the punch.

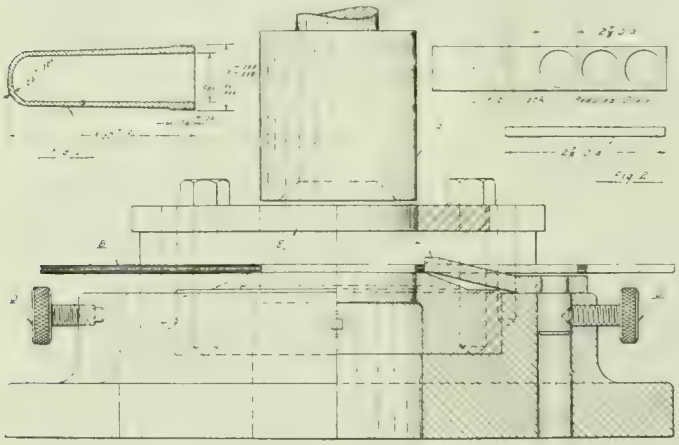
The casing after the second draw is shown in Fig. 6; the operation, which is the third, is represented by Fig. 7, the design being somewhat the same as that used for the first draw. The piece before the operation is shown by A. A similar self-adjusting die will also be noticed.

The third draw is shown in Fig. 9, and the piece, after this operation, in Fig. 8. A fixed die is used, as the piece has now been drawn to an even, concentric, wall thickness.

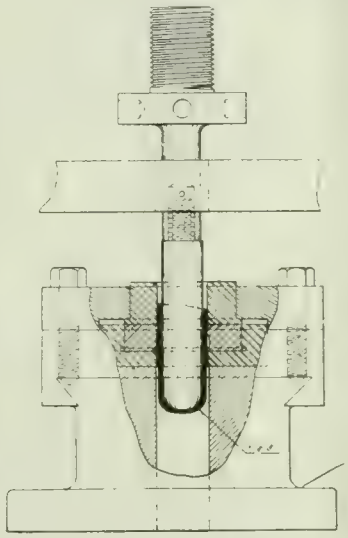
The fourth draw is carried out similar to the preceding one, for the same reason. The casing, after this draw, is represented in Fig. 9. The die used for this operation is shown in Fig. 10.

The sixth operation, that of tapering (external) the walls, is shown in Fig. 11, the punch being bottomed in the die to also insure the proper thickness of the base.

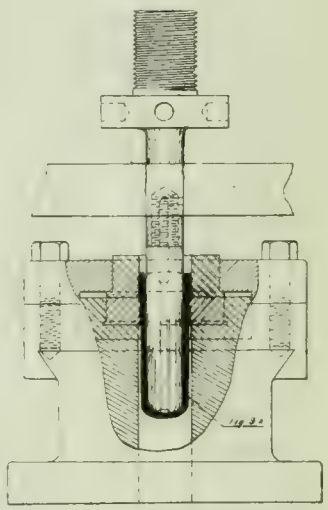
Lubricating holes in the plungers are provided for the use of a heavy graphite or plumbago to prevent sticking.



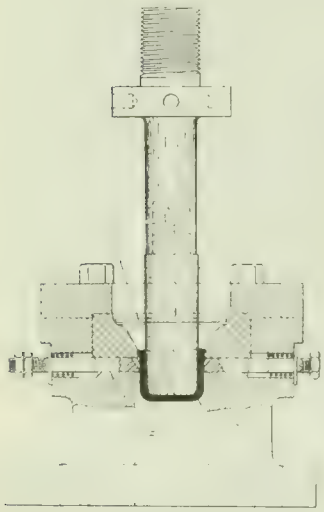
FIGS. 1, 2 AND 3—FIG. 3 SHOWS THE BLANKING DIE.



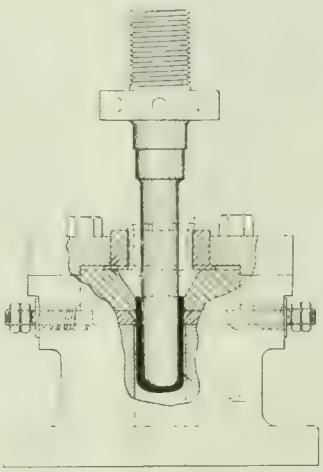
FIGS. 8 AND 9 FIG. 9 SHOWS THE THIRD DRAW.



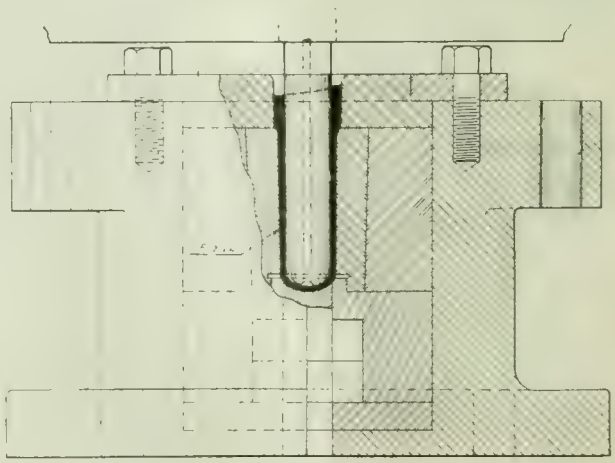
FIGS. 9A AND 10 THE FOURTH DRAW.



FIGS. 4 AND 5 FIG. 5 SHOWS FIRST DRAW.



FIGS. 6 AND 7.—FIG. 7 SHOWS SECOND DRAW.



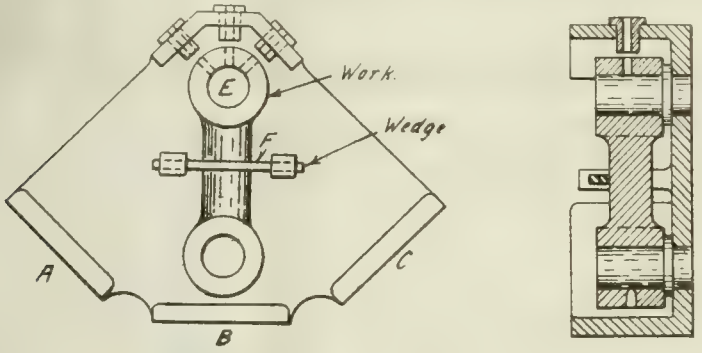
FIGS. 11 AND 12—THE LAST OPERATION.

THREE ANGLE ROLL-OVER JIG

By A. E. Kipps

The roll-over jig, as illustrated, has proved well worth its cost, and its simplicity will no doubt appeal to readers who can adopt the same principle to other castings of similar nature.

The three holes are spaced forty-five degrees apart, and of course the bases



THREE-ANGLE ROLL OVER JIG.

A, B, and C of jig are planed at similar angles.

The pins D and E hold the work in position, while the wedge F keeps the work securely in position for drilling.

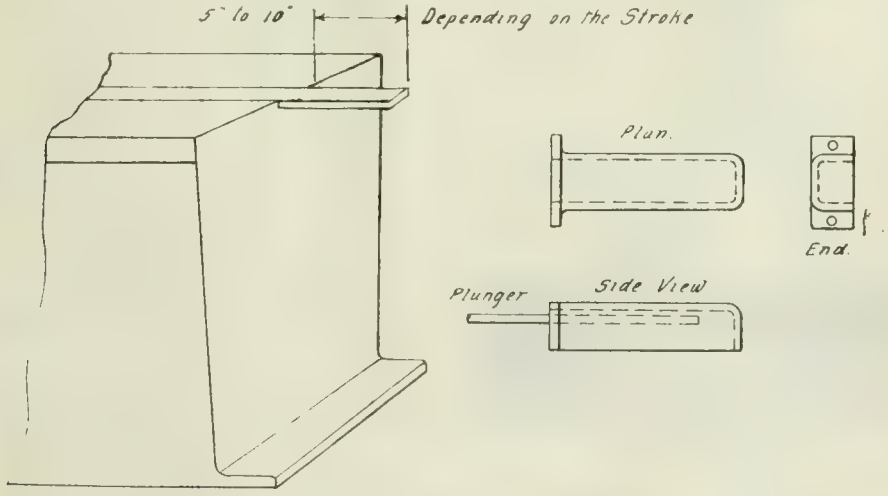
It is hardly necessary to further explain the jig, as it is practically self explanatory, except to say it saves considerable time and ensures accuracy and interchangeability.

SAFETY GUARD

By J. H. Moore

It is sometimes surprisingly easy to install some little guard which will make for safety.

One case in point is shown in the accompanying sketch. The plunger A travelled in and out about 5 in., and quite often gave passers-by quite a bump, but its chief delight was to hit the operator a whack in the stomach, and in spite



SAFETY GUARD FOR MOVEABLE MACHINE PARTS.

of all, the operator, though otherwise a careful worker, could never remember this moving part, and as it was made of 2 in. by ¾ in. machine steel, it could deliver quite a wallop.

We made a small grey iron guard as shown at B to go over the same at a cost of about $3, including pattern, and the trouble was removed. Is there some such problem in your shop?

A USEFUL DEVICE

Engineers who, in renewing a gauge glass under steam, have seen it crack on

the introduction of hot water, will be interested to know how to avoid this accident, which may happen with the last glass in stock. Get a bit of 16 or 17 gauge copper wire, some inches longer than the glass tube, and coil the ends in spirals that will just enter the tube —about 4 turns at each end, leaving the last of the wire in the centre. The hot water may then be turned on with safety. The cooling effect of the copper on the water is sufficient to save the glass, and the experiment is compared with that of putting a silver spoon in a thin glass when filling it with hot water. —M. E.

Starting a New Railway.—A new line is to be built between Hespeler and Preston, and work will begin at once. This was given out by Matthew Kirkwood, general manager of the Grand River Railway Co. The line will run between the present one and the Grand Trunk line, and will be on higher land, so that it will not be in danger of flooding during the spring. The old line was tied up every spring through the floods.

Do You Know That

Coal, low in volatile matter, is the best for hand-fired power plants in the prevention of smoke.

* * *

Although the form of the U. S. standard thread on paper locks very much unlike the Whitworth form in practice there is very little difference. The square top and bottom of the U. S. Standard are hardly ever found in ordinary commercial screws made by taps and dies or rolled. The crests of the threads in a tap or in a cutting or rolling die soon become rounded by the corners overheating and wearing away—and thus a radius is arrived at which closely approaches that of the Whitworth thread.

* * *

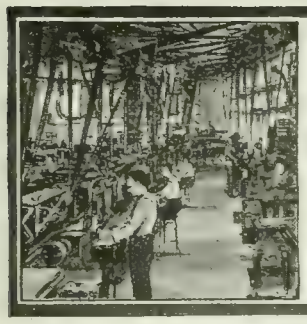
Helium, only slightly heavier than hydrogen, has been successfully used for filling arships and balloons. Its scarcity formerly kept the price up to $1,700 per cu. ft., and its only known source was from radium bearing ores. Since the war started however it was found that helium was present in large amounts in the natural gas of Texas and by liquefying this gas it could be recovered in a very pure state. Its main advantage over hydrogen was in its non-inflammability and it thus removed the greatest objection to the airship.

* * *

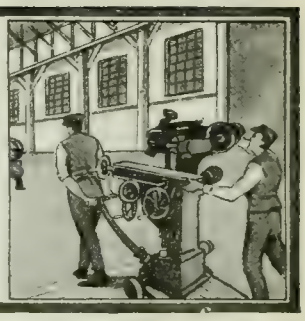
While the onion is the last thing one would imagine to have a practical use in the machine shop, it has been successfully used as a tempering medium replacing oil. The smell, as may well be imagined, is rather pronounced, but the results secured are very good. The method employed is to place the article to be tempered in a metal basin filled with chopped onions until it is quite cold. The onions can be used repeatedly. Small articles may be inserted in onions large enough to hold them. Garlic might do in a pinch, eh? The Germans are responsible for this latest atrocity.

* * *

Since the outbreak of war many new uses have been found for the metal magnesium. In combination with aluminium and other metals, it produces an alloy with a specific gravity about half that of aluminium, which is largely used for aeroplane work. On the other hand, if the weight has only to approach that of aluminium, a considerable admixture of heavy metals is possible; an alloy containing only 10.30 per cent. of magnesium is stated to have great strength. The formulae of some compositions containing magnesium and aluminium recommended for use in automobile and aeroplane construction, are given in Metallurgical and Chemical Engineering. Reference is made to a recent patent claiming that 92 per cent. of magnesium and 8 per cent. of aluminium gives an alloy of specific gravity 1.75, with a strength equal to that of gunmetal.



DEVELOPMENTS IN SHOP EQUIPMENT



Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

36 BY 60 GAP LATHE

The illustration shows a new gap lathe developed by the Canada Machinery Corporation, Galt. In many respects it is similar to the quick change gear lathe made by the same firm except in the driving mechanism of the feed screw where the quick change features have been eliminated and change gears substituted. By means of the feed box shown below the headstock, three changes may be instantly obtained. The design of the gap and gap plate is a decided improvement over former designs, the construction permitting the large face plate and thin work to swing without the removal of the plate. The bed, especially below the gap, is of unusual weight and strength to insure the maximum stiffness under the heaviest cuts. The saddle is substantial throughout, with great strength in the bridge, the bridge having a bearing on the flat surface inside the front V, in addition to the two V bearings. A bracket support, resting on the bed, for the saddle, is supplied to insure rigidity when turning large diameters.

The bed is unusually deep and rigid, and is thoroughly braced with cross ribs of box section. It is provided with three inverted V's of liberal proportions. The headstock and the tailstock each rest on one V and one flat surface, and the saddle bears on two V's and also on the flat surface. The brackets attached to the bed are made with a tongue fitting a groove in the bed, and the rack is of steel securely screwed and dowelled to the bed.

The headstock is massive and is equipped with split phosphor bronze bearings of large diameter provided with oil wells for lubrication. The spindle is of large diameter and is turned from high carbon steel.

Three changes of feed are obtainable through the feed box on the bed below the headstock. By changing the gears on the head and quadrant plate, any other desired feeds may be obtained. It is impossible to engage either the automatic cross or longitudinal feeds when the machine is set for screw cutting, or vice versa. The thread of the lead screw is used for screw cutting only. The feeds may be instantly reversed in the apron by a convenient lever. The saddle is securely clamped when using the cross feed. The lead screw is reversed for right and left hand threads by means of the reverse plate on the head.

A thread chasing dial, for indicating correct point for engaging nut for thread cutting, is provided on the carriage, obviating the necessity for stopping the lathe when screw cutting. A micrometer adjustment is provided on the handles of the cross screw and compound rest.

The tailstock is rigid and heavy, and is clamped to the bed by heavy bolts conveniently situated. It is so shaped as to permit compound rest to be set at right angles without interfering. The spindle is graduated in fractions of an inch for use in boring. The tailstock is adjustable across its base by means of a screw to permit of it being set over to turn tapers, the base being graduated for this purpose. The tailstock is provided with a traversing gear, operated by a handwheel working a pinion in the rack.

The lathe has the following dimensions:

Swing over shears	37"
Swing over gap	60"
Swing over saddle	24"
Width of gap clear of face plate	18½"
Distance between centres, 14' bed	6' 1"
Speed range of spindle	1.5 to 244
Diameter of spindle bearing front	6"
Length of spindle bearing front	10"
Diameter of spindle bearing rear	5⅛"
Length of spindle bearing, rear	7"
Diameter of hole through spindle	3⅛"
Taper of centres	No. 6 Morse
Diameter of tailstock spindle	4¾"
Size of steel for tools	1" x 2"
Thread range	1 to 18
Feed range	5 to 80
Weight of machine, 14' bed	19,000 lbs.
Weight of each extra two feet of bed	850 lbs.

MOTOR-DRIVEN 36-INCH GAP LATHE

PROFILE GRINDING MACHINE

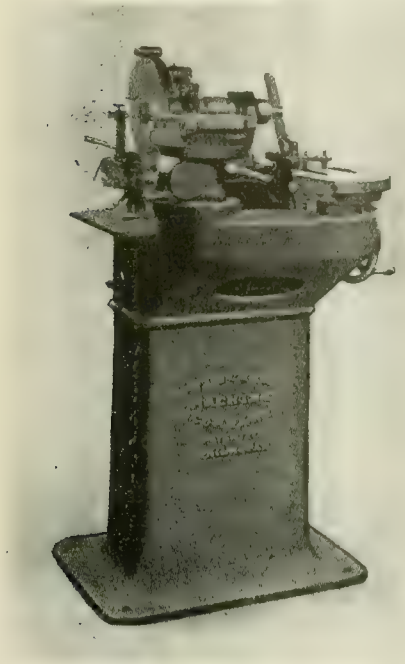
This machine made by the Fischer Machine Co., Philadelphia, has a maximum range of 8 inches in length. It is designed to grind irregular-formed turning tools such as are used in the machining of tire molds, shell tools, the flat tool for the relieving of formed milling cutters and irregular shapes designated for boring and turret machines. Heretofore the making of such a tool has proved itself an expensive operation, inasmuch as it requires a first-class tool maker from one to five days to shape any irregular form, no matter how skilled he may be in the art. With this profile grinding machine this time is reduced to a minimum.

The bed is made in the conventional box type, suitably ribbed for strength and solidity.

The spindle of the head is made of heat-treated and ground chrome nickel steel, which runs in special bronze tapered bearings to take up for wear, thrust bearings being also provided.

In handling the operation, a master form is fastened to the table. The piece to be ground is likewise clamped and both remain in a fixed position. As the grinding wheel is set in motion, the follower pin is kept in contact with the master form, the action of which is rack cross and longitudinal screw hand feeds.

The success of grinding a true shape hinges on the radius of the wheel corresponding with that of the former pin and this is well taken care of by means of a truing device set with a diamond point, cutting a perfect radius and made



PROFILE GRINDING MACHINE.

adjustable to conform with the two different radius wheels which are furnished with the machine, of ⅛ in. and ½ in. diameter of circle, and wherever possible, we recommend using the larger size wheel.

The Universal feature applies to both tables (the one holding the master form and the other the work to be ground), rotating in the same angle of direction with a fixed radius, permitting the tool to be ground on three sides, giving the right angle of clearance on the cutting tool.

LIFTING MAGNET

The Ohio Electric and Controller Mfg. Co. are making a lifting magneto in five sizes from 20 in. to 60 in. inclusive. The service rendered by the lifting magnet is indispensable and its breakdown takes on the nature of a calamity.

The principal causes of breakdown hitherto have been: First, Loosening of screw connections in terminal cavities, causing arcs, which soon burned out the open ends.

Second, Slow disintegration of the mica board insulation caused by the carbonization of the glue and the shellac binder, eventually resulting in a ground or short circuit.

Neither of these troubles usually come in the first year of operation but generally after 18 to 20 months' use, and as magnets are expensive, spares are seldom maintained; moreover, a spare purchased usually finds its way into regular use.

A third regular trouble has been the breakage of outer rings, though this is not so serious because new rings can be applied by the user, but it is very expensive.

These difficulties are all met and solved in the construction of the Ohio Mill Type Magnet as follows:

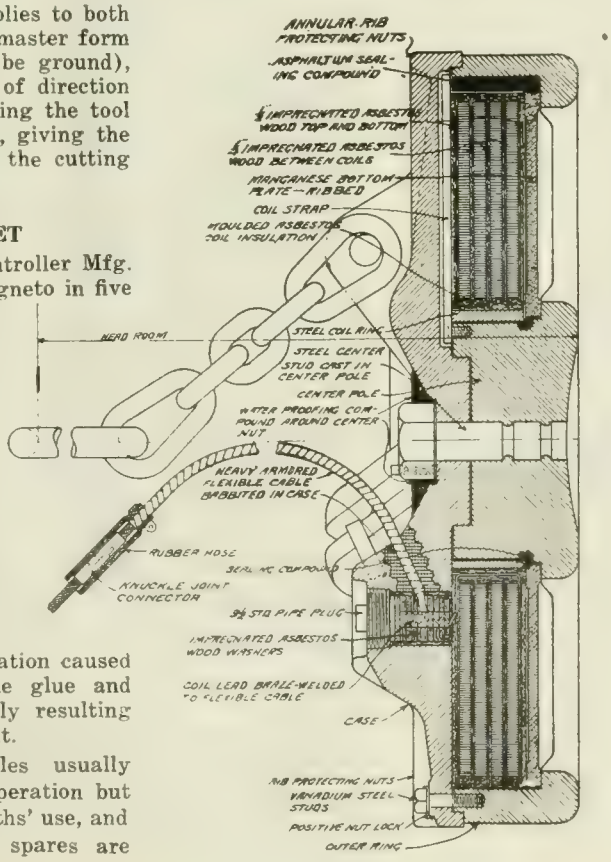
All electric circuit joints in the magnet are braze-welded. All coil insulation is asbestos with ¼ in. between layers, ½ in. top and bottom and ¾ in. around the centre.

Bakelite varnish is used to impregnate the asbestos ribbon between turns, and asphaltum to seal the magnet assembly against moisture.

The outer ring is over 8 in. high and of minimum cross section, over 16 square inches in the No. 5 and proportionately large in the other sizes. There are no through holes, the ring being supported by large chrome vanadium steel studs with nuts on top positively locked to studs and to case and thoroughly protected by a strong annular rib. The wearing section of the ring has over 8 square inches cross section, will wear indefinitely and will never break.

The coil strapped to the centre coil ring is a unit, and being clamped solid between case and bottom plate the heat of operation is rapidly radiated, hence the temperature rise for a two hour run, one minute on and one off, is not over 75 degrees centigrade.

The result is high operating current and splendid all day lifting capacity.



CROSS SECTION OF MAGNET.

SILICA BRICKS FROM OPEN-HEARTH FURNACES

By Mark Meredith

The results of an examination of bricks that have served in the arches of open-hearth furnaces is interesting, and the bricks examined had four distinct zones, viz.:

A.—The lower part, which had been in immediate contact with the flames, had a glazed surface with occasional protuberances or stalactites, indicating partial fusion. The fracture was light grey in color, and perfectly homogeneous in aspect though sometimes studded with bubbles.

B.—The adjacent zone, usually with a very clear line of demarcation, was black or very dark grey in color, equally homogeneous, and of considerable hardness.

C.—A transition zone, frequently appearing in the form of white spots in the middle of the black zone, and representing large initial grains of quartz which had not been completely absorbed. In other cases the black ground gave place to light brown, the original brick here appeared to have simply been impregnated with a fused brown substance.

D.—The topmost zone did not reveal any changes. Under the microscope and by polarized light, thin sections showed in zone B, large and very transparent tridymite crystals, the space between them being filled up with an opaque black matrix. In zone A the tridymite had fused, and the large crystals had been replaced by globules embedded in, but not intermixed with the opaque black constituent. In cooling, the fused tridymite was transformed into crystobalite, and in some places refrangible patches of ill-formed tridymite could be observed.

In the sections from zone C, large crystals of tridymite were also found, but gradually diminishing in size and number towards the less heated parts of the brick till in the D zone the structure was normal, as in the original bricks.

From analyses of the different zones it appears that zones A and B contain very varying and often considerable quantities of iron in various stages of oxidation, though approximating closely Fe_2O_3. The black ferruginous constituent, which does not mix with the silica in the fused portion of A, is drawn up by capillary attraction between the tridymite crystals of B. It is also probable that the lime in the brick ascends similarly in the form of a fusible silicate which impregnates zone C at the expense of the lower zones (in acid furnaces). The grey and black appearance of zone A and B has no connection with the iron content but is accounted for by the high transparency of the tridymite crystals, whilst the indefinite structure of the silicon A renders it translucent.

It is noteworthy that, as proved by direct experiment, the fusibility of the bricks is not appreciably modified by the very high proportions of iron oxide, hence the excellent behaviour of even the most strongly impregnated bricks at high temperatures.

The MacLean Publishing Company
LIMITED
(ESTABLISHED 1888)
JOHN BAYNE MACLEAN, President H. T. HUNTER, Vice-President
H. V. TYRRELL, General Manager
PUBLISHERS OF

CANADIAN MACHINERY
AND MANUFACTURING NEWS

A weekly journal devoted to the machinery and manufacturing interests.
B. G. NEWTON, Manager. A. R. KENNEDY, Managing Editor.
Associate Editors:
W. F. SUTHERLAND T. H. FENNER J. H. RODGERS (Montreal)

Office of Publication, 143-153 University Avenue, Toronto, Ontario

Vol. XXI. FEBRUARY 13, 1919 No. 7

An Oliver Message of Optimism

THERE'S something in the attitude of the Oliver Machinery Co. of Grand Rapids, Mich., that is well worth noting just now. They state that business has been good with them and they are not afraid to stand up and say so.

Why not others? We have had a regular procession of reports about cancellations of contracts and the subsequent difficulty of readjustment. We have been getting yards of material about firms "waiting" to see if there is going to be any change in the price of raw material. But there are few—mighty few—who are coming right out into the open and owning up to the fact that business is good enough to earn them three meals a day.

Here is what the Oliver people have to say about it:

"The month of January, 1919, showed the biggest shipment the Oliver Machinery Company has made in their history. Part of this is due, without question, to the fact that our export business has replaced some of the domestic business of previous months. Old export orders were allowed to be filled because of shipping conditions improving.

"Orders received during the month of January were also very gratifying, being within 10 per cent. of our average monthly business for the past year, while a part of our business, and we might say a substantial part, is export. At the same time, every time we receive an order for a carload of machinery for export we must bear in mind that we have to purchase a certain amount of steel, which purchase is domestic business. We have to purchase almost a carload of cast iron, which is indeed domestic business, etc., until all of the parts that go into our machinery are ordered. We hope that other people who are actually enjoying a good volume of business will publish the fact in the hope that those who are putting off purchases unnecessarily will see the error of their ways."

That message ought to be passed on. There's nothing so bad for the dumps as to find out that some person else has 'em. There's nothing that will help along a feeling of doubt and pessimism like a sermon from a man who is a regular honest-to-goodness pessimist himself. And there's nothing that will cure this thing so effectually as a good dose of "business is good" talk from men who are honest enough to say so.

Put Germany in Her Place

THE Allied world should beware of any of the molasses-mouthed people who seek to create the impression that terms should be as easy as possible for Germany.

Some of the German publicists have put up the plea that if the peace terms are made too hard the German people may be forced to fight again.

The Allies should see to it, before they dismiss their armies that the German nation is put in such a position that it cannot fight again even should it so desire.

What is the position? The shell shops of this country are out of commission. They are dismantled and much of the equipment is passing away as scrap or becoming covered with rust. In Germany the manufacture of munitions, according to the best reports available, is proceeding. They are also turning out ordnance of all descriptions at the Krupp plant.

The statement is also made, and it has not been denied, that Germany could, in fifteen days, call up an army of three million of her best soldiers. It is the business of the Allies to see to it at once that Germany cannot call up an army of three hundred, let alone three million, and also that she has nothing with which to arm her assassins.

What is the use of going ahead with peace talk while Germany is still turning out munitions and keeping her army in such shape that it can be a body of three million in fifteen days.

The Allies want to make it very certain that they are not going ahead with their peace conferences seated on the edged of a volcano.

There's a Mutual Interest Here

THERE are a number of shops in Canada where there are adamant rules forbidding access to the works to canvassers of any sort.

It is probably necessary that there should be rules of this sort. It is necessary for the employer to protect himself. He is paying for the time of the men in his employ, and is entitled to all of it. On the other hand, men working in factories very often prefer to have some sort of protection that will insure them against being bombarded daily by agents and canvassers who may be smart and glib enough to talk them into purchases that they will regret shortly after.

In a great number of cases representatives of the technical press are granted open door to the shops in order to give the men a chance to secure reading matter that will make them capable of doing better work and keeping abreast of the times.

CANADIAN MACHINERY has never yet asked any shop to give it special treatment in this regard. But it does not take much reasoning to see that the more men there are reading such a publication—and kindred publications as well—the higher will be the standard of shop knowledge, and the greater the efficiency of the staff.

Right now when new methods of production are being brought out—when the lessons of production gained from war work are being applied to present-day industry—is the time when it is very much to the interests of manufacturers to have the men in their shops reading CANADIAN MACHINERY. The publishers of this paper do not mean by this that they expect shop executives to agree to have the time of their men wasted or fooled away, but we do mean that, in the interests of the men who are ambitious and anxious to go ahead, there should be a reasonable amount of co-operation in the work of getting a greater circulation for a paper the sole aim of which is to make the mechanic a better mechanic by giving him the advantage of what some of the best authorities have found out by years of experimenting and research.

A Real Lesson in Thrift

A COLORED gentleman went into a down-town store to buy a suit of clothes. He wanted to pay about $20. In fact he had that much set aside for the purpose.

The clerk, well schooled in the art of making people buy what they couldn't afford to pay for, had the customer prancing around in a $35 outfit, and was telling him that that was the sort of togs he should wear.

The colored man simply smiled, stuck out for a $20 outfit, and remarked "I never hang my hat no higher than I can reach."

And there's quite a heap of common sense and wisdom in the saying.

Is there anything more painful than witnessing a man with a $2,000 income trying to make a splash that looks like that of his neighbor who reaches through the cashier's wicket for $5,000 per annum?

And yet it's being done all the time. Two dollars can't go as far as five, and two thousand can't do what five thousand can. That looks simple enough, but the people who fail to realize that fact would make quite a heap were they all pitchforked up together.

That colored man preached a pretty fair sermon on "thrift" when he announced his text as "I never hang my hat no higher than I can reach."

This Ought to Cure Them

IT'S quite evident that this is a day of plain speech. Folks are acquiring the habit of calling a spade a spade. And perhaps it's well that such should be the case.

There's one writer on the Kitanning, Pa., "Exchange," who has quit pussy-footing. He's got his pile of bricks and half bricks drawed up close to the editorial chair, and he tosses them around with a freedom that is amazing and an accuracy that would cause a guilty conscience to run for cover.

For instance, on the very important matter of bringing up girls in the proper way, he sayeth:—

"The mother who allows a 16-year-old daughter to float around the township in a top buggy until 2 a.m. with a counterfeit sport of weak paws and weaker morals, merely opens the front door to grief and disgrace. If you don't know what company your daughter keeps, or what time of night she turns in, your roar when gossips get busy will sound about as pathetic as the wheeze of a Jew's-harp. The girl who insists on spooning with everybody in the corporation limits ought to be taken back to the wood shed and relieved of her overflow of affection with a No. 11 slipper, laid carelessly across the hiplets. We had sooner see a girl kiss a blind shoat through a barbed wire fence than have her change partners six nights a week in the front parlor with the light turned low. It is harder to marry off a girl who has been pawed over by every boy in the community than it is to fatten sheep on pineapple ice. You can't goldbrick a sharp-eyed suitor with second-hand goods any more than you can fit a bathing robe on a goat."

Report Seems Rather Unlikely

THE statement in the daily press that Yarrows Limited, of Govan, Scotland, would close their plant and remove to British Columbia, is hard to accept.

The reason given for removing is to escape the labor troubles on the Clyde. This would be analogous to leaving a sinking ship, and embarking on a leaking lifeboat. Labor is no more imbued with sweet content in British Columbia than Scotland.

J. J. Coughlan, head of the firm of John Coughlan and Sons, Vancouver, in a recent statement, said that the attitude of labor was such as to threaten the continued existence of the shipbuilding industry. The following extract from the Victoria "Colonist" seems to bear out his statement:

The Admiral Watson came over from Seattle a few days ago with a broken crank-shaft. The workman at Yarrows, under instruction from their union leaders in Seattle, have refused to repair the vessel, as it is claimed she came here because the strike prevented her getting the work done in the States. Labor officials here refuse to say how long this will continue, but hint that the sympathy strike here will last as long as the strike in Seattle.

Apart altogether from the labor aspect there does not seem to be any reasonable grounds to imagine that Yarrows Ltd. would undertake any great expansion on the Pacific Coast. They have at present a very adequate plant, and the only crying need at present is for a large drydock.

The building yards on the Coast are engaged for the immediate future on the Canadian Government ships, and wooden vessels for export. After the completion of their present contracts, the volume of business they handle will depend largely on their ability to compete with the rest of the world at producing tonnage at a price.

ONE of the publicity planks in the farmers' platform declares that "every claim for tariff protection should be heard publicly before a special committee of Parliament." Better than this, we believe, is the suggestion which has been frequently voiced by *The Financial Post* for a permanent tariff commission. However, the two suggestions would appear to be no more than different means to the same practical end.

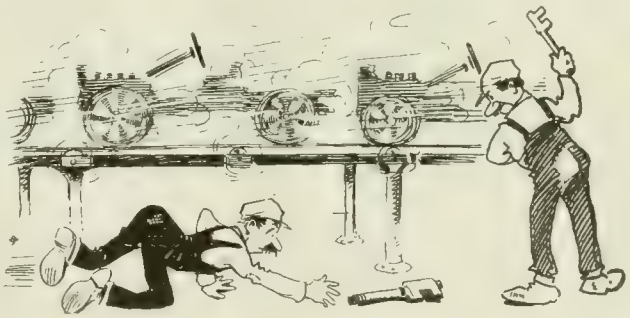
The tariff commission, *The Financial Post* believes, promises the best means of negotiating the "no man's land" between the opposing industrial and agricultural factions.—*The Financial Post.*

He Dropped the Monkey Wrench

HE sauntered into the office of the employment person. Lots of folks do the same thing. In fact the man in the employment office is some pumpkins these days. For the last three or four years folks haven't paid much attention to him, but things are a bit different just now.

However, this chap in question was looking for a job. He didn't have one—in fact that's the reason why he was lookin' for one.

Of course it's proper now to ask a few questions. For some time it's simply been a case of going in and having the employment person hug you and pass you on to the



boss. He, in turn, hugged you and advised you not to work too hard. But they're gettin' more particular now.

"Where've you been workin'?" was the first query.

"Ford's."

"How long?"

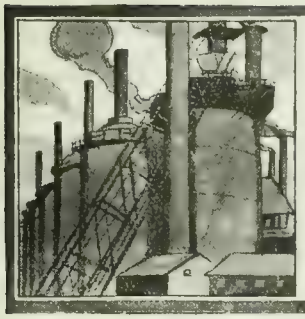
"Year."

"Quit or fired?"

"Canned."

"Why?"

"Dropped my wrench and seventeen machines went past before I could pick it up."



MARKET DEVELOPMENTS

A Fair Amount of Business in Some Lines Now

Reports From Several Sources Make it Certain That Machine Tool Trade is Far From Dead—Prices of Plate Cannot Apply Yet to Canadian Business on Account of Inability to Make Deliveries

ALTHOUGH reports have it that the mills of the United States Steel Corporation are still operating at 85 or 90 per cent. of their war-time capacity, it is not to be taken that they are selling at that rate. As a matter of fact sales have dropped materially, and the Corporation, which has an extensive system of storage, is making use of this section of its equipment. How long they can or will pursue this policy is problematical. It is interesting to note that the buyers seem willing to absorb high costs for automobiles, but when it comes to putting money into steel for industrial purposes they regard it as a very different matter, and fight shy of actual purchases.

Steel plate has not moved yet below the six cent price in Canadian warehouses. Dealers claim that they are not able to secure deliveries which will enable them to pass on the reduced price at once to the users here. As a matter of fact about one cent a pound is being paid by way of premium for quick delivery. Canadian warehouses for the most part are pretty well cleared out of war-price plate, and they should be able to quote prices based on the lower United States base price as soon as they can secure satisfactory deliveries.

On tubes, it may be said there are two prices now. If the buyer is urgent he is served from stock. If he can wait he places his order for delivery in about two weeks, and by the latter course he saves some ten per cent. on the transaction.

Some of the machine shops in the district are being kept fairly well supplied for the present on the work of rebuilding and changing machinery that has been taken by some of the dealers from the shell shop equipment that passed out of use the day the armistice was signed, or shortly after. There is a tendency, though, on the part of the dealers, to let this stuff slide. They do not want it unless they take it in at their own figure, and even then it must be in exceptional shape.

Several firms are at the point where they will shortly make announcements regarding their plans for the future. They are not likely to make any such announcements before they are ready to go ahead, feeling that were they to do this it would simply be inviting competition from others who might be figuring what to do with a very efficient plant and organization.

PAY HIGH FOR THE LUXURIES BUT HOLD BACK ON THE NECESSITIES

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., Feb. 13.—Buying of steel products has failed to maintain the pace of slight increases set in January, but has rather shown a disposition to taper off in the past week or ten days. The sum total of buying is, as a matter of fact, extremely small, representing possibly only one-fourth of the productive capacity. Production, of course, is much heavier than that in the aggregate, partly because all mills have a considerable volume of old orders to work on, and partly because in addition the United States Steel Corporation subsidiaries are making considerable material for stock.

Operating Rates

Independent steel mills are operating at various rates, generally between 40 and 60 per cent. capacity. The eastern mills seem to be operating, generally speaking, at lower rates than the Pittsburgh district and more westerly mills, the average of all the independents being about 50 per cent. The Steel Corporation subsidiaries as a whole are understood to be operating at an average of between 85 and 90 per cent. of capacity. Possibly their shipments on orders are somewhat heavier than are those of the independents, but the chief cause of the divergence is that the Steel Corporation subsidiaries are putting material into stock, while the independents do not appear to be doing this, at least to any extent.

The Steel Corporation is stocking material for the purpose of keeping its working forces employed. There may be some loss in doing this, as costs of production may be lower when the stocked material is eventually shipped, and there is also the expense of extra handling, but one offset to this is that costs of production per ton is less when a mill runs full, or nearly full, than when it runs at 50 or 60 per cent. With its string of large and efficient warehouses established during the past few years, from Boston and New York through Pittsburgh to Chicago and New Orleans the Steel Corporation has good storage facilities. It is only in the case of wire products, tubular goods, sheets and tin plates that mills are customarily built with storage facilities of their own, and thus in the case of bars, shapes and plates the Steel Corporation can store to much better advantage than can the independents, though of course there is an expense attached.

Prospective Operations

As old orders are running out and new buying is not increasing, the mills face continually decreasing operating rates until a change for the better comes. Some improvement, of course, is to be expected by spring. Mills are looking to the farmers rather than to the building trades for an early increase in buying, farmers being normally large consumers of wire products and of sheets. There is a fair demand for steel from the agricultural implement makers, indicating that the implement in-

terests expect good buying of their wares.

Building Activity

The first activity in new construction will doubtless be in the building trades, in erecting dwelling houses, which are ore or less scarce throughout the country. This may easily start much sooner than new construction along the line of large office buildings, hotels, bridges, factories, power stations, etc., and in that direction there is no sign whatever of any activity to come in the near future.

Everything is held back by high costs and by the indisposition of costs to come down at such a rate as would promise fair conditions in the near future. The situation is really an acute one. In the past few days representatives of sellers of building materials of various descriptions from all over the country have been in conference in Pittsburgh, their chief proposition being to consider whether it would be advisable to start, with funds contributed by all interested, a national campaign to encourage building, particularly of dwelling houses. This seemed to be a good idea, but the first thing that confronted the proposition was that men in the building trades in the Pittsburgh district, carpenters, bricklayers, plasterers, etc., have already formulated plans for demanding a 10 per cent. wage increase when the present agreement expires May 31. Most of them already are getting $8 a day or thereabouts. It was concluded that to start a publicity campaign for building at this time would simply encourage further increases in the cost of building, when it is unattractively high already, and there is now an effort on foot to secure the good offices of the Chamber of Commerce or some such authoritative representation, to take the matter up with the men and point out to them that the only way to make work is to reduce the cost so as to encourage those who have money to spend it.

Export Business

The United States Shipping Board has now reduced ocean freights to a parity with the reduced British rates, thus removing the great handicap under which steel makers of the United States had labored, when American rates were tens of dollars a ton above rates from British ports. Whether this equalization will result in much export business being booked by American mills ought to be developed within a couple of weeks. While the British mills had the start of the American mills, that is a small matter if the export trade is really to amount to anything, for the American industry is three times the size of the British and if there were enough export demand to make it an item for the American mills it would not set them back a great deal for the British mills first to fill up to a comfortable extent.

There is practically no demand for steel on the part of France, except that the American Sheet & Tin Plate Company has just booked an order from the French Government for about 25,000 tons of electrical sheets. While this is not a large order in point of tonnage it is a large quantity for the particular commodity involved, and the order means that the American Sheet & Tin Plate Company will be very busy in the departments involved to complete shipment in the time specified, 60 days. Demand for electrical sheets on the part of makers of electric machinery in the United States has been very slack the past two or three weeks, while just after the armistice was signed there was a very considerable demand. There has been very good buying of electrical sheets by makers of electrical equipment for automobiles, other lines being quiet. As electrical machinery is required when new projects are being undertaken, involving new construction of various classes, the outlook is not favorable. It is in new construction that the chief demand for steel normally comes.

Thus a scrutiny of the demand for steel products, in detail, indicates that the people have plenty of money to buy steel for ordinary everyday consumption and for luxuries, if automobiles are to be considered luxuries, but are unwilling to spend any money in investments. They regard costs as too high, and capital will lie idle or draw bond interest rates until the outlook changes. Meanwhile there can be no heavy demand for steel, commensurate with existing productive capacity. It cannot be said that high prices for steel products stand in the way. Steel prices will come down when steel producers see that it is worth while to reduce them. At present they get along better by maintaining them.

POINTS IN WEEK'S MARKETING NOTES

The Steel Corporation mills are still running about 85 or 90 per cent. They are storing material for stock as they have the storage facilities to do this. Old orders are running out and new buying is not taking its place on the books. This tends to increase rather than to lower the costs of operations. In turn it will probably delay the date on which the Corporation will be willing or able to move its prices to a lower level.

—

Reports from many sources say that buyers are willing to absorb high cost prices in the way of automobiles, but insist on a substantial reduction before they will think of buying steel to construct a building.

—

The U. S. Shipping Board has given a new rate which is destined to help American interests meet competition for European business. At one time British ports had an advantage of $10 per ton over United States.

—

Many U. S. firms are in a very embarrassing position because they—have not received settlements from the Government in regard to their war contracts. Much capital is tied up, and the firms cannot go ahead without it.

—

One of the largest firms of machine tool dealers in Toronto reports that business is much better. Sales made during the last week or so include a good assortment of lathes, millers, gear cutters, presses, etc.

—

There are practically two prices for boiler tube deliveries from a number of warehouses now. Out of stock for immediate delivery costs the buyer about ten per cent. more than if he places the order and waits for delivery from mills at the new prices.

—

There is nothing of note in the scrap metal business. Trading is limited to a few deals that amount to next to nothing. Sellers are anxious to shoulder their losses at once, but cannot get rid of material to do this. They feel the longer they hold their stocks the greater will be the losses.

BETTER SHOWING IN MACHINE TOOL SALES

Some Dealers Report That They Have Had a Good Week's Business

TORONTO—There are indications of a better trade in machine tools. Quite a few sales have been made during the past week. Some of the shops are becoming busy on rebuilding and overhauling equipment that has been taken from the shell shops.

The indications are that the scrap metal situation has gone to the limit in the matter of depression, and that with a few more concessions in price matters will come to the stage where business can be resumed.

Paying Premium

It is quite correct to say that what business is moving now in steel plate has a fairly large proportion of it that is being sold at a price which includes a premium for prompt delivery. As a matter of fact the three cent per pound price which was recently announced by the Steel Corporation is not being felt in this country, because the sales which are being put through now are for immediate delivery, and the mills able to give this can and are securing in the neighborhood of 3.75c and 4c per pound U. S points. The price very often depends on the urgency of the order.

Many of the warehouses in Canada are pretty low in stock, so that they should be in a position to give the users of plate in this country the advantage of the lower base price as soon as they begin to take this material into their stock. And here again the old question of the

next reduction—if it is to come—enters into the question. Many of the mill men declare that any further reduction in base prices can only be accomplished when there is a reduction in wages. The cut that was given out by Judge Gary, they hold, represented the concession that it was possible for the owners of the steel plants to make in order to start business moving again. Some of them state that they went as far as they could right at the start.

The Canadian trade is none too pleased with the new corporation that has been formed, taking in, as it does, nearly all the best mills from the independent group. Some of the Canadian sellers have had connections with some of the best U. S. mills that have lasted over a number of years. These connections have been valuable. It has meant that often it was possible to receive preferred treatment in the placing of orders, and large business was built up on this basis. In fact one of the large Canadian warehouse interests in 1917 did a business of over two million dollars with one American firm. That firm now is in the Consolidated Steel Corporation, and the Canadian firm feels already that they have lost a desirable connection.

The Tube Situation

The National Railways are buying quite heavily in tubes and plates, mostly for the shops at Moncton. The tube situation just now is one that comes under the two-price heading. This is not true in all cases, but in several it is. The warehouses have stocks in some cases that were taken in at war prices when skelp was scarce and costs very high. They have not enough of this to make them stampede the market, and they are able to get new steck at the lower prices, but it takes time. Buyers of tubes if they watch their needs ahead, can save a little money here. If they can so arrange matters that they can wait for a couple of weeks for delivery, they can buy tubes at ten per cent. below the price if they want them taken out of the stock that warehouses have on hand. There seems to be a tendency on the part of the Canadian trade in nearly every case to give the buyer the advantage as soon as it is possible to do so.

Have Had a Good Week

Some of the dealers in machine tools report that business is slack. Others fail to see the thing that way, and point quite readily to a good volume of business that has been actually booked during the past week. Apart from this there are a great many enquiries being sent out. It looks as though some of the prospective buyers of machine tools are feeling out the market before they decide to come out in the open and convert their queries into sales. Among equipment sold in one Toronto shop this week were presses, lathes, gear cutting machines, millers. A buyer from the Canadian Ford shops was in the city during the last few days, and secured some machine tools for his shops. The understanding, though we cannot state that it is official, is that the equipment now secured is for the making of starters for the Ford cars. It has been known for some time that it is the intention to make this change in the car, and it seems likely that the new equipment is for that purpose.

A report from the New York correspondent of CANADIAN MACHINERY states that it is the intention of the Willys-Overland Co. to turn out a car between $500 and $700, and the rumor on the street is that several of the plants connected with this same concern may be interested from the Canadian end of the business. Both the plant of the Russell Motor and the Willys-Overland are splendidly suited for this branch, both in tool room equipment, automatics, etc. Officials of the company here, though, are saying nothing about what they intend to do. One of them remarked to CANADIAN MACHINERY this morning, "How can we tell you what we don't know ourselves?" An announcement regarding their proposed operations may be expected before so very long.

Metals Are Easier

Slight reductions have been made in lake copper, and in electro copper. They are not deed cuts, and do not keep pace with the way in which copper scrap prices have been slashed. Tin is quoted locally at 65 cents per pound, and the market is fairly easy. Dealers report that it is comparatively easy to secure supplies of this metal now.

AMERICAN FIRMS HIT WHILE WAITING FOR THEIR ADJUSTMENTS

Special to CANADIAN MACHINERY

New York, Feb. 12.—American machinery trade has not recovered from the sudden ending of the war. Peace-time business is hesitant. January was a dull month, but the volume of sales in values was in many instances equal to that of January, 1917, when, however, prices were not more than half of those now prevailing.

Buyers have made a great many enquiries since the first of the year, but when quotations are furnished they decide, in a large majority of cases, to wait. There have no objections to paying what many characterize as "war-time prices." but another very important factor in holding back business is the slowness of the United States Government in settling claims of manufacturers who had war contracts cancelled. Some companies will not be financially able to go ahead full speed on peace business until after their claims have been paid.

Another market factor is the large quantities of new and used machine tools which the Government had on its hands at the conclusion of the war. At first the value of new tools, alone, was estimated at from $200,000,000 to $300,000,000, but recently this estimate has been revised to about $100,000,000. Second-hand tools are a drug on the market and dealers in most instances decline to handle them except on a strictly commission basis, wherein they assume no risks of financial loss. Many of the tools which were driven hard on war work will be fit only for scrap.

The arrangement made between the Government and the machine-tool industry, by which the latter will buy back many of the Government tools at an inventory valuation, will, it is believed, work out satisfactorily, provided the purchases are made at prices sufficiently reasonable to permit of a profit on their re-sale. Of course, machine-tool builders will have to reckon upon a declining market. Although prices on standard tools have thus far not declined much, if any, below war-time prices, it is admitted that lower prices must come as soon as the cost of raw materials and the labor wage situation will permit. There is talk of discounts of from 10 to 20 per cent. being granted on recent sales of new tools, but these concessions are mostly under cover, not being talked about openly.

The Government has on hand a considerable stock of locomotive and traveling cranes, hoists, etc., which probably will be disposed of through the builders of such equipment in a way similar to that agreed to by the machine-tool industry.

The outlook for the American machine trade, despite many handicaps, is not altogether discouraging. Export inquiry is slowly but steadily developing, and the lowering of ocean freight rates is expected to stimulate further demand from foreign fields. At present there are before the trade two French shipyard projects, for which a considerable quantity of fabricating machinery, forging equipment, cranes, etc., will be required, and it appears likely that the orders will soon be placed.

Great Britain's embargo on machine tools, effective March 1, has of course been somewhat disconcerting to the American machinery trade, but it is believed that this will not be of long duration. Great Britain's natural desire to protect her own finances and her labor in this crucial time is well understood here and there is no suggestion of any retaliatory measure at Washington. As regards machine tools there are barriers anyway which make it difficult, if not impossible, under present conditions for British tool builders to ship extensively to the United States. Foremost among these barriers is the high American tariff on foreign machine tools. Another is the

high production costs in England, but this latter, of course, will be overcome in time. One large British house (Alfred Herbert Ltd.) has been making plans to sell British tools in the American market, but it is considered doubtful here whether any such attempt will be made until conditions have returned more nearly to normal.

As indicated by the French inquiries for shipbuilding machinery mentioned above, there is a reviving interest in a merchant marine in that country. France's maritime position needs strengthening, as viewed by business interests in that country. This has been indicated by negotiations with the United States Shipping Board for the transfer of some American tonnage to French registry. In connection with these negotiations the Shipping Board is endeavoring to dispose of one large Pacific Coast shipbuilding plant to France. This yard was not completed, but all plans were decided upon and a good deal of the equipment was on the ground when the war ended. It is stated that the entire plant, so far as it has been built, could be readily transferred to French soil and completed there for construction of French ships.

Domestic machine-tool business is most promising now in automotive industry, automobile and tractor plants having come into the market in a fair way. The railroads, which were counted upon to supply a considerable volume of machinery business this year, are not buying and will not do so until the director-general of the United States Railroad Administration can obtain from Congress an appropriation of something over a half billion dollars, for which he is asking.

In the automobile field the largest single purchaser thus far is the General Motors Company, which now controls a half dozen or more of the leading plants. Expansion of facilities by this interest is in prospect and substantial orders were placed last week for equipment. The plans of the company, it is stated, include enlargement of the Chevrolet factory for the building of cars to sell at about $500. The Willys-Overland Company will also build a $500 car, reports being to the effect that the Curtiss aeroplane plant at Buffalo, which the Willys-Overland Company owns, will be utilized for that purpose.

A number of developments are under way in the farm tractor field, but the most promising is that of Henry Ford & Son, which, though not yet formally announced, is said to include a large plant on Green Island in the Hudson River, near Albany, New York, where tractors will be built largely for foreign trade. The plant will probably be very complete, including one or more blast furnaces. Iron ore will be brought from Lake Erie ports by barges through the New York State barge canal. The Hudson River will be dredged out at Green Island so that ocean-going vessels can load tractors at the Ford plant for foreign shipment.

In connection with the plans of the Navy Department for ten battleships and ten scout cruisers to be built within the next three years and the program of the United States Shipping Board for merchant ships of larger cargo-carrying capacity than are now being built, more dry docks will be needed, and a $7,500,000 project of this kind has just been begun by the Norfolk & Hampton Roads Dry Dock & Ship Repair Corporation, which has acquired a $600,000 site on Hampton Roads, near Norfolk, Virginia. Two of the largest floating dry docks in the world and two or three repair slips, with all necessary plate and angle shops, machine shops, forge shop, etc., will be provided.

A Shipping Board project, which was inaugurated during the war, but allowed to lapse when hostilities ended, is a large boiler plant to be built at Richmond, Virginia, by the Newport News Shipbuilding & Dry Dock Co., Newport News, Va. This plant will now be built at a cost of several hundred thousand dollars.

Such projects as these above mentioned, with others in the course of development, encourage the American machine-tool trade in the belief that, while business will not be far below last year's feverish pace, a normal demand will follow the present few months of uncertainty and readjustment.

MONTREAL MARKETS ARE STILL IN THE PERIOD OF UNCERTAINTY

Special to CANADIAN MACHINERY

MONTREAL, Quebec, Feb. 12.—Little has developed that would create more than a passing interest in the general industrial situation. The markets are virtually unchanged, the tendency being to await and see what the other fellow is doing, a feature of present activity that is not over-encouraging. The feeling is gathering headway that a steady decline will be marked in all commodities until a level has been reached where domestic buying can be renewed on a more extensive plan than at present. The curtailment of production of many lines is preventing an over-supply being accumulated, and this is aiding in maintaining a relatively high price on the different commodities. Buyers, however, are cautious, and little buying, other than for immediate needs is reported from dealers. The iron and steel section of the trade is on the downward trend and this is influencing all other branches. The machine tool business has had a quiet week with sales light. The metals are virtually unchanged and the demand is exceptionally light, no changes having taken place in price quotations. Scrap as usual is very dull.

Steel Prices Lowering

Optimism is still a feature of present market conditions but it is largely one of mind rather than of substance, as is clearly demonstrated in the waiting attitude that apparently dominates a large percentage of enterprises. In some quarters business is reported as good, but investigation brings out the fact that the greater volume of buying is for immediate needs only, very little interest being displayed in futures. When sellers of materials are asked regarding early possibilities they invariably answer that prices will not undergo any great change for some little time; on the other hand, the consumer, and sellers that are occasionally buyers, are evidently playing the waiting game in the prospect that the declining market will continue to go lower until a level has been reached where all-round confidence will open the way for a steady renewal of general activity. One of the greatest difficulties in reaching a low level in iron and steel quotations is the existing high costs of production of which labor is the outstanding factor. These conditions prohibit the over-production of material in face of a declining market, and the only alternative is the curtailment of steel output. Orders that were placed on the books during the heat of the war period, and not subject to cancellation, are nearing completion, so that many of the mills will shortly be faced with a situation in which competition will be a pronounced factor. It is not unlikely that within a few weeks the market will attain a position where domestic enterprise on a pre-war basis will be encouraged by the more reasonable level of price conditions. The local situation is comparatively unchanged, and dealers report a fair volume of business; not that activity is over-emphasized, but, considering the circumstances, the business passing is very encouraging.

The trend of the American market is reflected in the lower prices quoted here for different commodities. Plate demand is steady and quotations here are easier by 1c per pound, the price quoted being $6 per 100 pounds for ¼ inch up, and $6.50 for 3-16 inch. Sheet movement is lighter and mills are reported to be curtailing production. Black sheets No. 28 are quoted at $7, and No. 10 at $6.50 per 100 pounds. This represents a drop of 1c and 1½c per pound respectively. Canada plates are quoted at $8.50 for both dull and bright, the decline being ½c on the former and 1c on the latter. Boiler tubes are still in good demand, but with the exception of several sizes of lapwelded, prices are maintained. Quotations on 2¼ inch, 2½ inch, 3½ inch, and 4 inch, have been advanced, the respective prices being $37, $42, $55, and $70 per 100 feet.

Little Doing in Machine Tools

Circulated reports regarding the uncertain attitude of the Canadian Govern-

ment, as to their retrenching policy respecting shipbuilding, has injected some nervousness into machine tool circles. For some time activities in this branch of the country's industry has been a factor in machine tool demand and this latest rumor has not stimulated the market. The trade here does not look for a cessation in shipbuilding activity, and although the week has been quieter than usual, the volume of general business has been a fair average. A feature of present business that marks the post-war development is the change that is noted in the selling part of the trade. Whereas, a few months ago Canadian buyers were searching the entire field for machinery, we now have American representatives here soliciting business.

Second-hand trading is not as active as formerly, but sales are still being made of such munitions equipment as can be adapted to other uses. Special shell machines are receiving little attention, many firms having taken this and piled it in one section of the shop, drawing on it at intervals for special repair work. The stopping of war work has left all metal-working plants well stocked with transmission equipment much of which can be used for general purposes. As stated by one firm, "we have enough of this class of equipment to keep us going for a couple of years."

BRITISH MAKERS OF PIG IRON ARE GETTING THE BUSINESS NOW

THE reduced ocean freight rates have enabled American makers of pig iron to offer lower quotations on their product for export, but generally speaking they are still at a disadvantage as compared with English competitors. In the few instances where American furnaces have found themselves placed advantageously as compared with the English makers, it has been where the rate to the particular port favors American iron or where the desirability or otherwise of carrying pig iron as ballast figures in the making of the freight rate. There is a good deal of foreign enquiry in the market, but the domestic situation is without any life: Following are the leading features of the pig iron situation from various parts of the country.

NEW YORK—A fairly large order for Europe, which was offered at a price based on the new freight rate, was lost to an English competitor, the reason being a difference of several dollars per ton on the delivered price. About 1,000 to 2,000 tons American foundry and basic have been sold to Europe during the past week. There appears to be an almost entire lack of business in the domestic market, as inquiries reported in previous weeks have not been followed up, and new enquiries are lacking. The domestic business transacted has been less than 1,000 tons altogether. The $3 price reduction has been extended by some makers to cover all contracts on their books up to Dec. 31st but this course does not find favor with all of them.

PHILADELPHIA—The market is very weak here as far as any new business is concerned, and leaders believe that best way to meet the situation is to still further curtail production. There has been little enquiry, and sales have confined to carload lots.

BUFFALO—There has been quite a fair amount of business moving in carload lots, though there have been no large enquiries this past week. It is the opinion among producers that there will be a revival of business in the near future They expect this to become apparent during the last week of February. In the case of unfilled contracts made before the first of the year, producers are accepting the $3 reduction, although one interest does this only in special cases. There is apparently no stocking of iron in this district.

CLEVELAND.—There is still a period of stagnation in the market here. There have been some enquiries for export, including one for 1,000 tons of foundry and one of 1,000 tons of bessemer for the far East, during the week. What sales there have been have been of carload lots, and very scattered. There is some piling of iron in this district.

CHICAGO.—About all the business there is in the Chicago market is the occasional buying of a carload lot needed to sweeten or change a mixture. There is no enquiry for iron, as melters have enough iron in their yards or on order to supply their requirements for some time to come.

CINCINNATI.—There are no enquiries from any source whatever. What new sales there are are confined to foundry grades for prompt shipment. There is no willingness on the part of buyers to make any commitments for the future.

ST. LOUIS.—Some small lots for prompt shipment cover the enquiries and actual sales during the past week. This district is too far from the seaboard to be affected by the reduction in freight rates. The tendency is for makers who are not covered for the future, to take a chance, and they are not buying to any extent for future needs.

BIRMINGHAM.—While some companies are maintaining the base price of $34, quotations of $31 for No. 2 foundry are more prominent than of yore. Very few sales are being reported.

PITTSBURGH.—There is a fairly rapid accumulation of iron going on in makers' yards, owing to customers holding up shipments. Consumers are not making any enquiries for supplies, and are not even trying to get full shipments on contracts they already have. Some iron producers have intimated their willingness to sell iron for the first quarter on a sliding scale, the price to be fixed the first of each month.

There is expectation that several of the merchant stacks will be blown out shortly for necessary repairs.

DECLINE APPROACHES ITS LIMIT AND SCRAP MAY TURN FOR BETTER

THE scrap market is still going through a period of depression, though there are some indications that the decline is approaching its limit. There are various shades of dullness in different districts, and in some cases there are other materials competing with the regular grade of scrap. Melting steel has sold as low as $15.50 and stove plate at $14. Following are reports from different districts in the country.

PHILADELPHIA. — A number of shells and other material are now on the market, and competing with the regular grades of scrap. A lot of 2,500 completed 6-inch shells were sold to a Pennsylvania consumer for use as heavy melting steel, the price reported being $21 delivered. A sale of 10,000 tons of beam ends from one eastern steelmaker to another was the largest transaction of the last two weeks.

PITTSBURGH.—The present attitude of consumers of scrap iron and steel is one of diffidence, and there is no business offering. The supplies in the hands of the consumers are sufficient to last for at least three months. Whatever bids are offering are usually two or three dollars lower than the dealers think the material is worth. There is a large quantity of heavy melting steel available and offering at $18 and if any business were being done it would be at about this level.

CHICAGO.—Prices generally on most grades are holding, and in very few cases have new or lower quotations been made. A little better volume of buying has been noted, and consumers seem a little more open to business than was the case in January. Dealers are professing to see signs of much better business during the next 30 or 60 days. A feature of the market is that stove plate and light cast are quoted at a higher price than railroad malleable and heavy melting steel. The Chicago and North Western has issued a list offering 3,850 tons of scrap including 750 tons of steel rail.

ST. LOUIS.—There is no market here at present. Consumers are as little willing to buy as at any time in recent years. There is no tendency on the part of buyers to make a bid, and in the rare cases when they do so, the bid is usually too low to make it worth considering from the dealer's standpoint. There has been no alteration in prices this week, the reason being that there has been no business to base a new price on A small quantity of assorted scrap from the St. Louis Terminal Railway was the only railroad list before the market this week.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$31 40
Lake Superior, charcoal, Chicago	38 85
Standard low phos., Philadelphia	
Bessemer, Pittsburgh	33 60
Basic, Valley furnace	30 00

Government prices

	Montreal	Toronto
Hamilton		
Victoria		50 00

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Iron bars, base, Toronto	$ 4 75
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	
Steel bars, Pittsburgh	2 70
Tank plates, Pittsburgh	3 00
Structural shapes, Pittsburgh	2 80
Steel hoops, Pittsburgh	3 30

F.O.B., Toronto Warehouse

Steel bars	5 50
Small shapes	5 75

F.O.B. Chicago Warehouse

Steel bars	4 10
Structural shapes	4 20
Plates	4 45

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$26 00	$ 24 00
Electro copper	26 00	23 00
Castings, copper	25 00	21 00
Tin	70 00	65 00
Spelter	9 50	8 50
Lead	8 50	7 00
Antimony	10 00	10 00
Aluminum	40 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 6 00	$ 6 00
Plates, 3-16 in.	6 50	6 25

Per 100 lbs.

Per ton

Price List No. 38

Standard Buttweld

Per 100 feet

⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$15 00	$13 00
Copper, crucible	19 50	15 00
Copper, heavy	18 50	15 00
Copper, wire	18 50	15 00
No. 1 machine composition	18 00	14 00
New brass cuttings	10 00	10 00
Red brass turnings	13 00	10 00
Yellow brass turnings	9 00	8 00
Light brass	7 00	7 50
Medium brass	9 00	9 00
Scrap zinc	5½-6	5 00
Heavy lead	5½	8 00
Tea lead	4½	3 50
Aluminum	18 00	18 00
	Per Ton	
Heavy melting steel	15 00	15 00
Shell turnings	9 00	8 00
Boiler plate	16 00	15 00
Axles (wrought iron)	36 00	15 00
Rails	20 00	15 00
No. 1 machine cast iron	28 00	18 00
Malleable scrap	21 00	15 00
Pipe wrought	14 00	8 00
Car wheels	25-30	18 00
Steel axles	34 00	20 00
Mach. shop turnings	9 00	6 00
Stove plate	16 00	14 00
Cast boring	11 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd. brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

Per gross ton

BILLETS

Bessemer billets	$43 50
Open-hearth Billets	43 50
O.H. sheet bars	47 00
Forging billets	56 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅜ in. and larger		$7 50
Spikes, æ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	0 35
Solder, guaranteed	0 40
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 60%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 7 00	$ 7 00
Sheets, black, No. 10	6 50	6 90
Canada plates, dull, 52 sheets	8 50	8 10
Can. plates, all bright	8 50	9 50
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head,28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	8 20
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅝ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$32 00	$.....
1¼ in.	36 00	.....
1½ in.	39 00	32 00
1¾ in.	39 00	32 00
2 in.	45 00	32 00
2¼ in.	48 00	34 00
2½ in.	50 00	40 50
3 in.	58 00	45 00
3¼ in.	.....	52 00
3½ in.	70 00	54 00
4 in.	80 00	67 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal, bulk	18½
Palacine	21½
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	49½
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	13½

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE.

White.	Cts. per lb.		
XXX Extra	20	Atlas	18½
Peerless	21	X Empire	17¼
Grand	19¾	Ideal	17¼
Superior	19¾	X press	16
X L C R	18½		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10¾
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

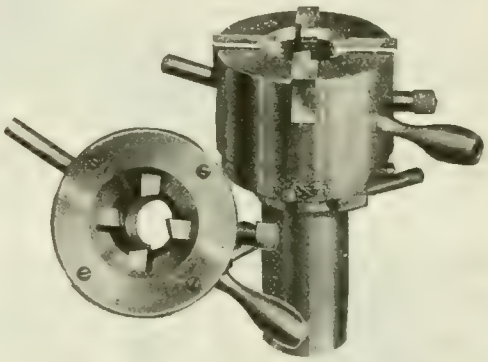
THE A.R.WILLIAMS MACHINERY CO. LTD
64 FRONT ST. W. TORONTO, ONT.
SALES SUPPLY DEPARTMENT SERVICE

MODERN EQUIPMENT

Success or failure marks its stamp on any manufacturer. They are the known quantities that reveal to the manufacturer himself and his competitors "The end thereof."

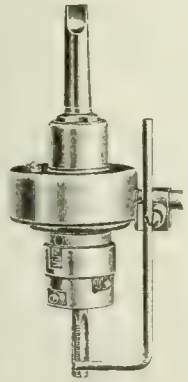
MODERN EQUIPMENT is the tried and proven Key to Success. Reputable tools means known success. Make them yours.

GEOMETRIC DIE HEADS



For rapid and economical production of threaded parts in quantities, GEOMETRIC Self-Opening and Adjustable Die Heads are a required necessity, all pitches and forms of thread being obtainable. They can be used for roughing and finishing work and for accuracy in performance have no rival. They are so designed that on Standard Turret Heads they can be readily and quickly attached. They are made in sizes suitable for all classes of threading, in that the chasers are interchangeable from the smallest to the largest capacity of head.

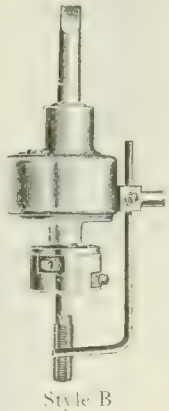
Put your threading production on the Modern basis by equipping with GEOMETRIC



Style C

ERRINGTON TAPPING CHUCKS

Automatic Reverse Tapping Chucks that require no reversing mechanism on the drill press, as it drives the tap in, stops automatically and backs the tap out with quick return by simply raising the drill spindle. Tap breakage is practically eliminated. These tapping chucks will fit any standard type of drill press. Are obtainable in the positive or friction drive type. Simplicity of operation makes the Errington a modern addition.



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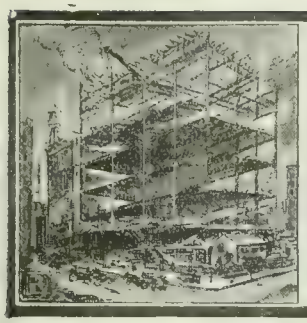


INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Montreal.—Improvements to the Montreal aqueduct system, whereby the city water supply will be increased by 20,000,000 gallons per day, has been definitely decided on by the Administrative Commission. Tenders for the construction of the suction pipe, which will give an additional head of two feet, have already been received. The new conduit will be six feet wide by eight feet high, and will cost approximately $55,000; it is anticipated that it will be ready for use by June 1. It is estimated that the increased supply will suffice for three years.

MARINE

Gore Bay.—Capt. James Purvis, the owner of the steamer "Winona," which carries the mails between Gore Bay and Cutler, was in Gore Bay recently. The "Winona" is being lengthened and otherwise improved at the Wiarton Marine Railway, and Capt. Purvis is looking after the alterations.

LACK OF ODERS BRINGS SHIP YARDS FACE TO FACE WITH DIFFICULTY

THERE seems to be a very great probability of the shipbuilding industry in Toronto coming to a premature close, according to the statements of the men representing the two large companies, the Polson Iron Works, and the Dominion Shipbuilding Co. These companies have work in sight and now under way sufficient to keep them busy until the middle of summer, but after that there is the prospect only of curtailed activities and complete shutdown. This is at a time when unemployment is likely to be a serious problem, and when practically every other yard in the country will be busily employed building ships for the Canadian Government and for private purchasers.

The Canadian Government are building at present in Canadian yards a merchant fleet approximating 350,000 tons dead weight. The orders for these ships have been spread from coast to coast and every plant capable of handling a ship has received an order, with the exception of the Toronto yards. A short time ago a firm from the States leased a yard in British Columbia, and received an order for several ships. From a point of view of efficiency there are no better yards anywhere in the country than there are in Toronto, and there seems to be no good reason on the surface for passing them by. There should be a demand for tonnage in the next four of five years sufficient to keep all the yards of the Dominion comfortably employed.

Not only have the Government left out the Toronto yards when giving their contracts, but according to a statement by Mr. J. B. Miller it is through the action of the Government that the Polson Iron Works are without further contracts.

Mr. Miller states that he closed contracts in 1917 for ten vessels for Norwegian interests for delivery in 1919-20-21. Before making the contract the necessary permission was sought from Ottawa, and Mr. Miller was given to understand this would be granted. On this assumption the contract, amounting to $6,650,000, was closed, and the Polson Iron Works received a first payment from the purchasers of 10 per cent. of the contract price. Applying to the Government for a copy of the order-in-council, to give the purchasers, Mr. Miller was told it had not been signed, and furthermore would not be, the reason given being that the Government would need all the Canadian yards for the building of their own fleet. The Government stood fast to this decision, and protest was of no avail, the result being the contract had to be cancelled, and the payment already received returned. When the Government gave the contracts for the fleet, none came to Toronto.

This means that as far as can be seen the Polson Iron Works must close down as soon as present contracts are finished, which will be in the next few months.

It is planned now to send a committee of leading citizens to petition the Government, with a view to having some orders placed with the local firms. These yards give direct employment to 3,000 men, and many outside industries will be affected if these plants cease operations through lack of orders.

Victoria.—The Cholberg Ship Company, which is constructing nine wooden schooners for Norwegian interests, state that the first of these ships will be named the "Washington," and she will be barquentine rigged. The launch is expected to take place within the next two months.

Montreal.—A contract has just been closed between the Canadian Vickers Limited and an important French group for the construction of a steel steamer of 8,300 tons, for the coal and nitrate trade between France and Chili. It is expected that the vessel will be delivered ready for service before July this year.

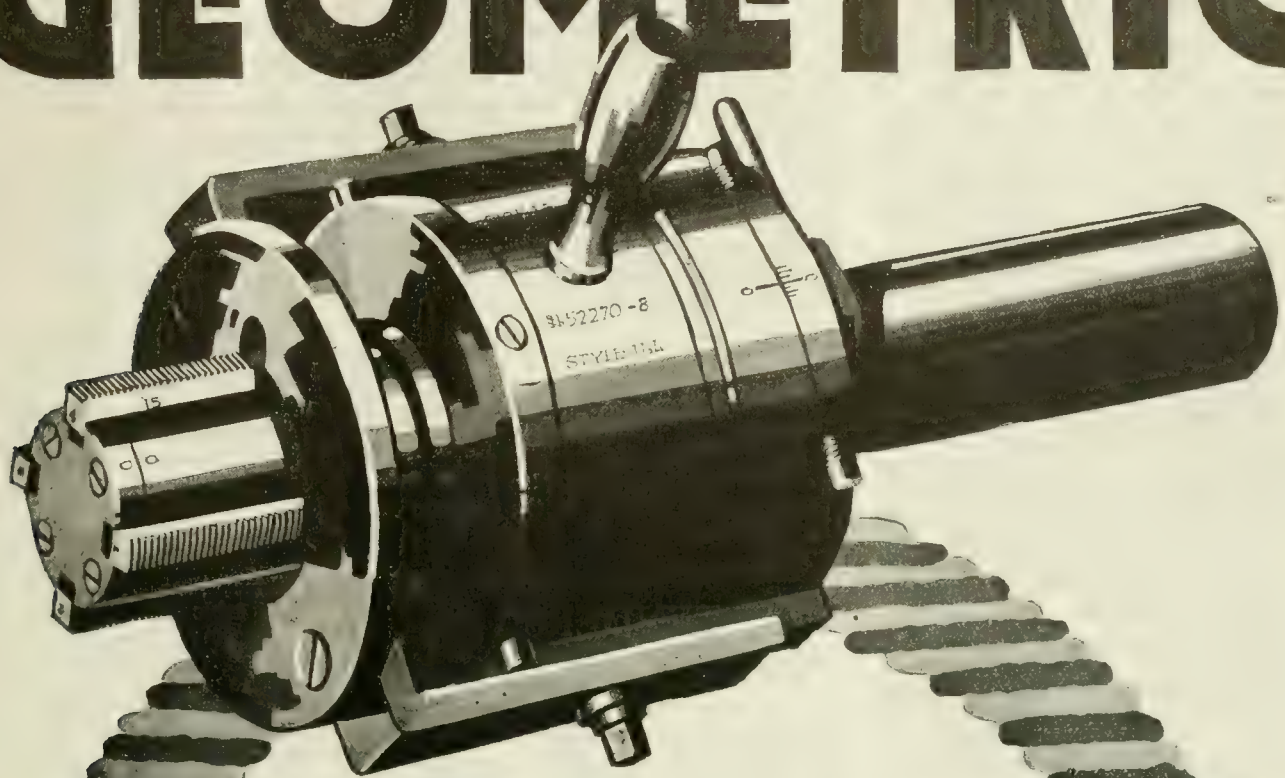
Halifax.—During the past week an inspection was made of the Halifax shipyards, dock terminals and reconstructed area by Grant Hall and W. R. MacInnes, vice-presidents of the C. P. R., and G. E. Graham, general manager of the Dominion Atlantic Railway, the inspection of the latter railroad being the primary object of the visit.

Ottawa.—The Government is not prepared to build any more ships after the present programme of fifty is completed, according to a statement in the "Ottawa Journal." Contracts for forty-six of these vessels have already been let. The Government never had any intention of building any more ships, so that there is not much chance of Toronto securing any.

Vancouver, B.C.—There has been another considerable drop in shipping rates set by the United States Shipping Board, but this has not yet extended to Canada. The drop this time has been from $30 per ton to $15 per ton, or $12 per ton measurement. Cargo space has been offering in Vancouver recently at $21.50, but the rate at Seattle being $6 50 less, shippers held back. Canadian steamship companies have no intention as yet to meet the cut.

Owen Sound.—Capt. Alexander McLeod one of the best known captains on the lakes died after a short illness at his home here. Capt. McLeod was for twenty years master in the fleet of the Pittsburgh Steamship Co., sailing some of their largest freighters. The whaleback steamer Rockefeller was his last command. He retired five years ago on a pension and since then has acted as pilot for American vessels entering Canadian waters. He is survived by his widow, one daughter and three sons.

GEOMETRIC



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Quebec.—The "Canadian Pioneer,' launched in December last from the yard of the Canadian Vickers Co. at Montreal, has been fitting out for the last six weeks at Quebec. She is now ready to start on her run to Halifax, the boilers and engines having been fitted and tested. She is now coaling, and will leave immediately her coal is on board. The engineers who have had charge of the installation of the machinery express themselves as quite satisfied with the facilities provided and the labor available at Quebec.

Victoria.—Work on the contract for the French Government wooden ships is proceeding with a vim at the yards of the Foundation Co. here. There is a good chance that if the present rate of construction keeps up the first ship will be launched by the first week in March. The contract is for twenty ships, and eight of them are in various stages of construction. There are at present about 3,000 men on the payroll of the company, and this will be increased when the planking and caulking stages of construction are reached. Work is being carried on in three shifts so that it is practically continuous.

Montreal.—Economy in ocean transportation was the subject of a paper read by A. W. Robinson, M.I.C.E. at a recent meeting of the Montreal branch of the Engineering Institute of Canada. The speaker emphasized the necessity of adopting large vessels of a standard type as an important economic feature in transportation problems. Mr. Robinson considered the most simple and direct method of reducing operating costs was to increase the capacity of cargo ships so they could carry more tons of freight per unit of labor and material. Co-ordination, co-operation and standardization were the keynotes of the address.

Victoria.—At a meeting of Dominion Council of the Navy League in Victoria, B.C., last week, W. G. Ross of the Montreal Harbor Commissioners, who has been president of the League for the past four years, tendered his resignation. Commodore Aemilius Jarvis, of Toronto, was elected president of the League for the ensuing term. At the conclusion of this meeting, Mr. Ross was presented with a handsome loving cup in recognition of his services. A resolution was passed that the League strongly impress upon the Government the absolute necessity of permanently maintaining the naval colleges in Canada.

Liverpool.—A shipowner and shipbuilder of the United States, interviewed recently at this port, had some interesting things to say of the United States shipbuilding programme. The gentleman in question was Mr. Christopher Hannevig, and he characterized the United States programme as an orgy of extravagance and miscalculation. He says that the Shipping Board entering on the construction of so many ships at once, created a situation that was speedily exploited by labor, with the result that costs went soaring to a degree hitherto unknown, and beyond all hope of profitable operation.

Toronto.—An interesting double event took place at the Polson Iron Works, when the steamer "War Temiskaming" was launched, and the "War Aquila" had her name changed to "War Hamilton." These two ships were named in honor of the districts carrying off the highest scores in the Victory Loan Campaign. The "War Temiskaming" is the full canal size freighter, of 261 ft. by 43 ft. 6 ins. by 23 ft. 6 inches depth, of which so many have been built. She took the water promptly at the assigned time, and joined company with the "War Hydra" and "War Hamilton." The two latter will both be ready for sea at the opening of navigation.

PERSONAL

F. Perry has been appointed president of the Canada Foundries Company in place of Edgar McDougall, deceased. Mr. Perry is a native of Montreal, and was formerly a director of the company. The vice-president is Major V. J. Hughes.

TENDERS

OTTAWA.—The Department of Indian Affairs, Ottawa, are calling for tenders for the construction of two reinforced concrete culverts in the Caradoc I.R. All plans and specifications can be seen at the post office at London and St. Thomas, also at the office of the Indian agent at Muncey, and at Ottawa.

OTTAWA.—The department of the Naval Service are calling for tenders for the purchase of naval vessels lying at Halifax, Sydney and Liverpool. Tenders will be received up till noon on the 20th February, and full particulars and permission to view may be obtained on application to the Deputy Minister of Naval Service or the Admiral Superintendent H. M. C. Dockyard, Halifax. N.S.

OTTAWA.—The Department of Public Works of the Federal Government are calling for tenders for the construction of a steel highway bridge between the cities of Ottawa and Hull. Tenders will be received until noon April 16th, 1919. Particulars can be obtained at the Department of Public Works, Ottawa, and at the offices of the District Engineers, Shaughnessy Building, Montreal; Equity Building, Toronto, and at the Post Office, Hamilton.

TRADE GOSSIP

Take Agency.—The Yeates Machinery and Supply Co. have taken over the Canadian agency for the McCrosky Reamer Co., of Meadville, Pa.

India Wants Rails.—The Canadian Trade Commission in Ottawa has received a cablegram from the Canadian Mission in London stating that India is in the market for 800,000 tons of rails with angles, bolts, spikes, etc., for delivery in 1919, 1920, 1921.

Shipping Credit is Extended.—Instead of the 96 hours credit ordered on shipment by shippers providing satisfactory bonds, on Canadian railways and 48 hours on United States roads, the Canadian Government has extended the credit to one week. This was in response to appeals from a number of shippers.

Considering Express Charges.—The Railway Board is considering the application of the Express Traffic Association of Canada for increased rates. They are also considering the proposed increase by the railways in local switching tariffs, in regard to which there have been several conferences between the interests affected.

Coal Embargo Removed.—All restrictions upon the exports of anthracite coal from the United States to the Province of Ontario have been removed by order of Dr. Garfield, United States Fuel Controller. There were about 220 towns which were unable to secure coal on account of this embargo, and they will now be able to secure any fuel they require.

Permit System Ends.—The Belgian Consul General for Canada has received an official cable from Brussels, making the announcement that the permit system covering imports has been cancelled as far as the majority of imported articles are concerned. The import of sugar, breadstuffs, malt barley, oats, tobacco, raw and manufactured, wines and liquors is still subject to the permit system.

Two Hundred Men Affected.—After many years of continuous operation, the plant and elevator of the Montreal Transportation Co. at Kingston is closing down temporarily. The managing director, Mr. L. L. Henderson, vice-president and general manager of the company, says that they hope to resume operations in the near future. About 200 hundred men are affected as a result of the closing down.

Good Order for Locomotives.—The American Locomotive Co. have secured an order for 62 locomotives for foreign roads. Of these forty for the South African railways will be built in the Montreal plant of the company. The engines are to be of the large mountain type, and will weigh from 94 to 97 tons each. The other purchasers are the Provincial Railways of Sante Fe, Argentina and Portuguese East Africa.

Large Pulp Mill for Fort William.—It is reported that a large pulp mill, to cost $100,000, will be erected shortly in Fort William. It is said that Fort William took a large block of stock, and the principals in the undertaking decided to build their mill in Fort William. The proposed plant will, it is said, be built on Island No. 2, where the local man referred to acquired a large section of very valuable water front property not long ago.

A Correction.—An unfortunate error occurred in connection with the advertisement of the Montreal General Tool Co., which appeared in our Annual Review Number, page 356. Under the heading of "Shop Equipment" the words "10 Drill Presses Swing up to 60,"

should have read, "16 Engine Lathes swing up to 60." This firm is exceptionally well equipped to handle general machine shop repair work on very short notice.

To Build Large Warehouse.—The Government is going to build in the near future a new customs examining warehouse, which will extend from Bay to Yonge on Front street, Toronto. The building will be of the same general design as the Union Station, except that it will not be flush with the street, but set back a little way. For a time a part of the building will be used as a General Post Office, but next year the Government proposes to erect a new post office on the square bounded by Adelaide, Lombard, and Victoria streets.

New Industry for Walkerville.—Products derived from toluol are to be manufactured in a Walkerville chemical plant, which have never before been produced in Canada. One of the most important will be benzoate of soda, which is largely used in preservation of food, such as fruits, jams and preserves. Another product will be benzoldehyde, largely used in manufacturing dyes. There is no market for this in Canada, but it is expected to find a ready sale for it in England and Japan.

Quick Settlement Obtained.—Advice has been received from the Imperial Munitions Board, that all claims on finished contracts for British account will be settled within the next two weeks. The contracts for the United States Government cannot be settled as quickly as those for the British. The adjustments for the American business are being handled by the Imperial Munitions Board as representatives of the United States Government assisted by two American officers.

Big Business Booked.—British shipyards have recently booked orders for well over 100 vessels, representing a very large tonnage. This is probably a record. The Ellerman-Bucknall line alone ordered over 50 steamers on the north-east coast. The British India Company is building nine large liners; the Cunard eight, the Donaldson-Anchor and Donaldson Brothers six, Ellis and Fyfe four, Shaw-Savill-Albion three, Union Castle, Commonwealth and Dominion Companies two each.

Wants a Swing Bridge.—A deputation of the Elgin and Middlesex and St. Thomas County Councils were in Ottawa recently to see Hon. F. B. Carvell, Minister of Public Works. The object of the visitors was to petition the Minister on behalf of harbor extensions and the erection of a swing bridge at Port Stanley. The estimated cost of the alterations would be about $30,000. The Minister, while making no definite promise to the deputation, was impressed by the necessity and promised to take it before council.

New Industries for Mathieson.—Mathieson is shortly to have two new industries, one to be known as the Mathieson Lumber Co. The chief promoter is Mr. R. S. Porter, and the company proposes to build a mill having a capacity of 1,500 to 2,500 feet per day. The second company will be known as the Mathieson Products, Limited, the promoter being Mr. D. L. Stover. This company will operate a flour and feed mill, a grist mill, a bakery, and a creamery, and later will utilize the waters of the Black River for generating light and power.

Want Exemption.—At a recent sitting of the Private Bills Committee of the Province of Quebec, consideration was given to the request of the British-American Nickel Corporation, to the municipal council of the Township of Hull, for the privilege of being exempt from all municipal taxation for a period of twenty years. The plant, which is partly constructed, will cost about a million dollars, is to be utilized for nickel refining and will employ 150 men. Some slight objection was raised, but it was decided to approve of the measure and send the application back to the House for the third reading.

Marine Needed.—That Canada should have a merchant marine, is the opinion expressed by J. J. Walsh, secretary of the Toronto branch of the Canadian Manufacturers' Association. "We have taken an active part in making representations to the Government to that effect for quite a numbers of years," he said, "and it is absolutely necessary that

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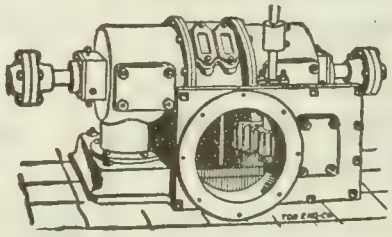

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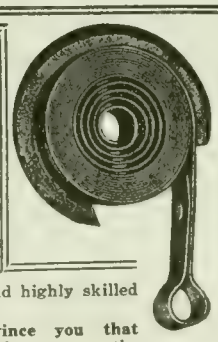

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the Government should continue its program." Mr. Walsh also stated that a representative of the C.M.A. would accompany the deputation to Ottawa on Thursday to lay Toronto's case, relative to the shipping situation faced as a result of the Government's failure to provide further orders, before the Cabinet.

Work Kept in Canada.—At a meeting of the District Trades and Labor Council the decision of the Government not to allow any further contracts for engines and boilers to be given out of Canada was made known. The Union of Machinists had requested the Minister of Labor's support to their demands for a thirty-three hour week, as a measure to relieve unemployment. Delegate John Munro said that as a result of their action, the Government intended to give the contracts for two ships to Toronto, stop any contracts for engines and boilers going out of Canada, and was going to give contracts immediately for a number of locomotives.

Lumber Men Not Jumping.—The lumber men of Ontario are sending a representative to Great Britain to look for lumber orders for reconstruction work. The lumber interests in Quebec are not following this course, but are taking the attitude that the Government can submit their requirements and then the lumber men will bid on them. They agree that there will be a lot of lumber required in Europe, and the question will be to secure sufficient lumber and ships to supply the demand. They all agree however that they cannot sell lumber to the British and French Governments at the last prices paid by those Governments, and they are inclined to sit tight and see in which way events will shape themselves.

Chemical Industries.—Arrangements have been made by the Council of Scientific and Industrial Research for a thorough census of the Canadian chemical industries. It is desired to gather complete data regarding new activities in Canada as a consequence of war requirements and the forced stoppage of chemical supplies from Germany and Austria. The opportunities and prospects for expansion will also be carefully considered. S. J. Cook has been transferred from the Dominion Analysis Branch to the Trade and Commerce Department, and will give all his time to the supervision of this new work. It is a notable fact that, both in Canada and the United States, there are hundreds of articles on exhibition that have been manufactured here for the first time, and the action of the Council

Want Charter Changed.—A. C. Flumerfelt, president of the International Coal and Coke Company, Ltd., with collieries at Coleman, Alberta, has issued a notice to shareholders requesting proxies for a change in corporation from the State of Washington to a corporation to be chartered under the laws of the Dominion of Canada. While the operations of the Company are in the Province of Alberta, the company, being a United States charter, has to pay taxes in the United States, which are now costing between $1,200 and $1,500 per month, and as well pay taxes under the Canadian laws. By operating under the Canadian law United States taxes will be eliminated. In view of the high prices the company is receiving for its product and development at the mine, together with the installation of by-product coke ovens, the company is enjoying considerable prosperity and is rapidly increasing its financial strength. Two dividends amounting to three per cent. have been paid to the shareholders during the year.

Advertise Bolshevism and You Destroy It

Why It Cannot Stand the Light

CONTINUED FROM PAGE TWO

crime may follow the war she loosed on the world. She need, therefore, be but little surprised if there is a lack of outside sympathy for her in the afflictions that beset her at home. But if Bolshevism, the doctrine of the Nihilist cutthroats and their feeble-minded followers, has brought to Germany a riddle to solve, it has brought a problem also for peoples who had been engaged in peaceful pursuits and who meditated no career of national crime.

How much of a problem is it going to be for America? Are our Socialists turning into Reds and our Reds into Bolsheviki, and if so, how far is American patience to be stretched? That there could be a broad seeding-ground for such doctrines in America, so that they could grow to be a menace to our free institutions, is something too preposterous to merit discussion or consideration.

Bolshevism is the foe primarily and essentially of business and of business men. It has been observed that the Reds disregard the two extremes in the social scale; that they make no quarrel with the very highly placed, or with the very lowly. Their war is against those in between. Capital—meaning those engaged in active, progressive, constructive work, in the utilizing of human energy in industry and trade and in the development of the civilized well-being of peoples is the avowed enemy. They affirm at times that they the part of a movement in which labor is an element. In reality, however, the Reds class skilled labor in the same category as capital. It also is the enemy. Indeed, their bitterest assaults have been made against trained workingmen, for they are fully conscious that their appeal can conceivably be hearkened to only by the untrained, the shiftless, theh unskilled, the ignorant, and the incompetent.

America's Workmen a Bulwark Against Bolshevism

Can anyone imagine the skilled American workingman, who bathes and shaves, wears clean linen, eats clean food, lives in clean surroundings, and has a high degree of education, accepting instruction on the vital things of life from the illiterate foreigner whose living conditions have been those of the dumb animals with whom he has lived in stables or pens, or those of the filthiest slums of the poorest cities of the world? The American workingman, to-day in the ranks of labor, tomorrow may be in the ranks of capital. Is he likely to listen to some mouthing criminal or maniac who asks him to help tear down the social fabric that permits his sons and daughters to participate in all the refinements of a cultured existence, to receive high school and university training, and to aspire to the most exalted position in a free community? It is an insult to the American workingman to have his name invoked by the Reds.

There is official authority for the statement that the Bolshevist workers, by claiming affinity with American organized labor, have been successfully creating enemies for the latter. The American workingman may stand this provocation up to a certain point, but he may be counted on to take characteristically vigorous action if it goes too far.

There is money in Bolshevism. Lenine and Trotzky have had millions at their disposal, and hundreds of thousands of dollars have been traced from European Russia across Siberia and the Pacific Ocean to New York and other American cities. And. besides, the disciples of Lenine in America practice systematically the levying of tolls on those who foregather with them. As long as this condition lasts there will always be leaders for the Reds, men crafty and clever, willing to take a risk where the stake seems worth while, men to whom America and American institutions mean nothing, if not something to make money by jousting at. Whatever the fool sheep may be induced to do, these wolves who herd the sheep are shrewd enough to keep within the letter of the American laws.

They take no chances of losing their fat living. American laws do not furnish sufficient protection against such treacherous enemies of the country as these. It has been suggested that the remedy is to alter the laws. For a long time past there has been a sentiment in judicial quarters that a way should be provided of getting after the perverted and unassimilable immigrant and the undesirable citizen.

No Hope of Relief by Revision of Immigrant Laws?

The Reds in our midst are in a well-defined class. Invariably the directing minds, the wise ones who control the stupid are foreigners—foreigners in heart, whatever may be their status of citizenship. Deportation has been suggested as a remedy for their case. Of course the ideal way to handle the undesirable immigrant is to deport him from Ellis Island before he has ever had a chance to put a foot on the continent.

To try to get him out once he has stepped ashore is quite another matter. Some of the ablest statesmen in America have expressed the conviction that our

Continued on page 63

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Nitro-starch, which in some of its properties is superior to nitro-cellulose (guncotton) and nitro-glycerine, seemed at one time likely to establish itself as a useful explosive, but as formerly manufactured it was wanting in stability. Perhaps its constitution was not fully understood. War requirements directed attention to this compound and a safe explosive was produced from tapioca starch. This starch has long been used in large quantities by the Post Office Department for the gum of postage stamps. The need for this substance in the form of an explosive led to a search for a substitute. This was soon discovered, and after rapid but intense research it was found that nitro-starch possessing the required stability can be made from corn-starch, the product being better in quality and cheaper than that obtained from tapioca.

M. M.

SCRAP NEWS

NEW YORK.—While the market is still weak, reductions are not so general, and are smaller in amount. During the week there has been a decline in heavy and machinery cast, which are offering now at from $23 to $24 per ton. The lowest price noted so far was on a sale of five cars of heavy melting steel which sold at $13.65 f.o.b. New York. A better demand is anticipated, as the strike at the local foundries has been ended.

BUFFALO.—The decline in the local scrap market is showing signs of reaching its finish. No reductions in the nominal prices of various grades have been reported this week, and local dealers take this as an indication that the bottom has been reached. Mills are not much interested in the market, most of them having enough stock on hand to last them for the next three months.

CLEVELAND.—Notwithstanding the small volume of business that is being turned over, the prices still seem to be moving down. Melting steel has been purchased in small lots lately at $15.50, while some small sales are reported at $16. With stove plate at $14 and malleable at $19, pre-war prices have been reached. A buying market is not expected to develop before the second quarter begins.

MODERN SHOP PRACTICE VOL. I
MODERN SHOP PRACTICE VOL. II
MODERN SHOP PRACTICE VOL. III
MODERN SHOP PRACTICE VOL. IV
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Advertise Bolshevism and You Destroy It

Why It Cannot Stand the Light

CONTINUED FROM PAGE 61

immigration laws, at least as they have been applied during the last ten or fifteen years, are utterly inadequate for the protection of the country. But powerful influences have steadily shown an ability to obstruct any serious attempt to bring about reform in the immigration laws, or in the method of supplying them, and it is no secret that there is a general belief among politicians that any legislator who undertook in a vigorous way to have such modifications effected in the immigration laws, would be likely soon to cease to be a figure in public life. So these remedies of deportation and of change in the national laws do not offer much prospect of being available at a sufficiently early date to allow them to be used with effect against the Reds.

But there is one excellent remedy which would surely and effectively suit the case. It is the simple one of publicity.

Bolshevism, the conception of ignorance and crime, may thrive on mystery and obscurantism, on foreign words and hocus-pocus. Shown up in its nakedness it would be grotesque and ridiculous.

Tell the American people all about the Reds and their "doctrines," and the abomination would perish from our country. A dose of advertising would shrivel it up.

American business men are interested in undertaking such a course of publicity. The weaker vessels in our midst are numerous. It would not merely be good business, it would be humanitarian work, to impress on the less tutored minds the viciousness and the danger of such un-American doctrines, and to direct them with precision as to the course they should follow if they found themselves face to face with the enemies of America and of its institutions.

Organized labor would seem to have a particular interest in promoting on its own account such a campaign of advertising. Samuel Gompers, president of the American Federation of Labor, recently declared that the Bolshevist movement is causing a direct injury to American organized labor. "Bolshevism," he said, "is as great an attempt to disrupt the trade unions as it is to overturn the Government of the United States." He added that the Reds had effectively been creating enemies for the labor unions.

What better remedy—indeed what other remedy—can organized labor find for the protection of its interests and of its reputation than frank advertising handled by experts, giving to the public the exact facts on its own principles and on its attitude and dealing a smashing blow to the foul fiend of treason and anarchism?

IMPERIAL MUNITIONS BOARD OFFER FOR SALE

PLANT AND EQUIPMENT (IN PART) OF

British Cordite Co., Ltd., Nobel, Ont.

TENDERS, accompanied by marked cheque for 5% of the amount of the bid, will be received by the undersigned up to and including February 20th, 1919, for the purchase of the following, located at Nobel, Ontario:—

ITEM NO. 1. POWER HOUSE.—Building of steel frame construction on concrete foundations.

Boiler-room Equipment.—10-400 H.-P. Wickes, vertical, water tube boilers, equipped with Murphy Automatic Stokers and 2-1 ton coal-weighing lorries.

Ash Handling System—American Steam Jet Ash Conveyor.

Power-House Equipment.—3 Turbo Generators, 3 phase, 2200 volt, 60 cycle; 1-750 K.W. Allis Chalmers; 1-500 K.W. General Electric; 1-1000 K.W. Westinghouse-Parsons, complete with Westinghouse LeBlanc Jet Condenser and 80 H.P. Sturtevant Turbine direct connected to Booster Pump; 1-25 K.W. Westinghouse-Turbo Exciter Set, 125 volt; 1-25 K.W. Canadian Fairbanks-Morse Motor Exciter Set, 550-volt motor, 125-volt generator; 1-30 K.V.A. constant current transformer.

Switchboard—11 panels fully equipped, 1-10 K.V.A., 2200-110 volts and 3-40 K.V.A., 2200-550 volts, Pittsburgh Transformers; 2-18 x 10 x 12 Worthington Fire Pumps; 2-14 x 22 x 14 x 16 Ingersoll-Rand Air Compressors; 2 No. 785 Cochrane feed water heaters; 4 Alberger heaters; 2-Frick Ammonia Compressors, 30 and 70-ton capacity; 2-4" Goulds Centrifugal Pumps, direct connected to 15 H.P. motors; 4-1¼ x 8 and 2-5½ x 8 Deane Single Acting Triplex Pumps, belt driven; 1-42 x 10½ x 48 Hydraulic Pnuematic Accumulator.

ITEM NO. 2. PUMPING STATION.—Equipment –6-9 x 12 Aldrich Triplex Pumps, directly connected to 40 H.P. Canadian Fairbanks-Morse, 550 volt, 40 amp., 60 cycle, 3 phase motor, with starting compensators and switch boxes; capacity 500 gallons per minute; 3-75 K.V.A., 2200-550 volts and 1-550-100 volts Pittsburgh Transformers.

ITEM NO. 3. MACHINE TOOLS.—18" Engine Lathe; 20" Drill Press; No. 4 Power Saw; Keyway Cutter; 16" Stroke Shaper; 10" Emery Wheel Stand; No. 34 Little Giant Screwing Machine with taps and dies.

ITEM NO. 4. TANKS. Steel Horizontal—33—6' to 20' diameter. Steel Vertical—41—3' to 8' diameter.

ITEM NO. 5. STOVES.—7 Nos. 41 and 42 Quebec Heaters; 5 Oxford Ranges and 16 Oil Stoves.

ITEM NO. 6. STEEL CANS.—12,900 Steel Cans, with lugs and lids, 11½" x 12" x 3-32".

ITEM NO. 7. COTTAGES.—15 Cottages, frame construction, 20' x 34'.

ITEM NO. 8. PRESSES.—8 Dehydrating Presses (Hydraulic).

ITEM NO. 9. PUMPS.—8 Gardner Duplex Pumps, 7" x 3½" x 10".

ITEM NO. 10. WRINGERS.—20 Centrifugal Wringers 24".

ITEM NO. 11. STOCK DRYERS.—3 Sargent (Stock Dryers).

ITEM NO. 12. PICKER MACHINES.—3 Davis and Furber Picker Machines 36".

ITEM NO. 13. KNEADERS.—52 Kneader Machines.

ITEM NO. 14. PRESSES.—19 Darling Presses (Hydraulic). 22 Inglis Presses (Hydraulic).

ITEM NO. 15. PUMPS.—46 Hydraulic Triplex Worthington Pumps, 1 x 4 for 2,000 pounds pressure.

ITEM NO. 16. PUMPS.—10 Vertical Triplex Single Acting, belt driven Worthington Pumps, 3½" x 6" for 250 Pounds Pressure.

ITEM NO. 17. PUMPS.—6 Aldrich Pumps, Vertical, Triplex, Back plunger of the solid water end type, double reduction, direct geared for 900 R.P.M. Motor, 9" x 12", Cap. 500 G.P.M., lift 150'.

ITEM NO. 18. BELTING.—A quantity of leather and rubber belting.

Tenders for these items in whole or in part will be considered. The owner will dismantle and load on cars; bids are to be made on this basis. Intending purchasers will be given every facility to inspect the buildings and equipment. Complete information may be obtained from the undersigned.

The highest or any tender not necessarily accepted.

Cheques from unsuccessful bidders will be promptly returned.

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ONE 3/16" ADT. MODEL AUTOMATIC WIRE straightener and cutting machine arranged to cut a maximum of 10 feet. E. M. Bride, 113 4th Ave. East, Calgary, Alberta. (c11m)

ONE SECOND-HAND JENCKES CORLISS ENgine—12" x 30". Cut, description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

FOR SALE—1 SPINDLE, GRIDLEY, AUTOmatic, ¾-inch capacity, second-hand, perfect condition, slightly used. Ontario Metal Products Company, Limited. (c15m)

TWO NEW STEAM TURBINE BLOWERS for blast or cupola use. Size and particulars on application or can be seen running. Apply to Box 141, Tilbury, Ont. (c7m)

ONE CLAYTON 6" x 8" x 6" AIR COMPRESsor in first-class condition. W. G. Utley, Machinist, Yarmouth, N.S. (c8m)

MACHINERY WANTED

SIX-FOOT RADIAL DRILL FOR BOILER shop; lathe to take in 12' between centers; air hoist, 10" cylinder, 4' lift with trolley; vertical air receiver, 44" inside dia., 14' high. The National Shipbuilding Co., Ltd., Goderich, Ont.

WANTED—BULLDOZER (USED), MEDIUM size. Drilling machine, 4-spindle, straightling, No. 4 Morse, 7' or 8' between outside spindles. Both must be good. Box 554, Canadian Machinery. (c8m)

WANTED TO PURCHASE, SMALL ELECTRIC spot welder, 550 or 110 volt, 60 cycle, 2 phase circuit. Renfrew Machinery Co., Ltd., Renfrew, Ont. (c7m)

COMPLETE WELDING OUTFIT, MUST BE IN first-class shape. Prest-O-Lite preferred. Send price and particulars to F. Clark, 95 Woodland Ave., St. Catharines. (c9m)

Leading English manufacturers require responsible Firm to act as sole selling agents in Canada for their Milling Cutters and Small Tools. Also for their Hardening and Heat-treatment Furnaces. Managing Director will be in New York end of February. Please send full communications to "Hardening," c/o "American Machinist," 10th Avenue, 36th Street, New York.

(c7m)

POSITIONS WANTED

FORGE AND DROP HAMMER SUPERINTENDent will be open for a position shortly Experienced in drop hammer and machinery blacksmithing, upsetting, bulldozers. Long experience in all classes of forge work. Can design dies and harden them. Box 552, Canadian Machinery. (c9m)

FIRST-CLASS MECHANIC, EDUCATED, MARried. 15 years' experience in practice and technique, desires to connect in above capacity with firm manufacturing traction and other farm engines for South, Central America or West Indian trade, with view to travelling afterwards in their erection, demonstration or sales anywhere in above territory. Am native of West Indies and have travelled South America; know the language and people, hence possess an advantage. Highest references. Box 550, Canadian Machinery. (c7m)

HELP WANTED

WANTED—A CAPABLE MACHINE TOOL salesman. State experience. Box 553, Canadian Machinery. (c14m)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

WANTED TO PURCHASE

SECOND-HAND FACE LATHE, in good condition, 84 inch Face-plate, with tail stock, and one or two rests. Give name of maker and all particulars. Swedish Steel & Importing Co., Ltd., 507 Canadian Express Building, Montreal Que. (c8m)

FOR SALE

Two 3 x 36" geared feed Turret Chucking machines with 3" collet chucks, about 3½ years old. Price, each $700.00.

Three 3 x 36" Friction Feed Chucking machines without Collet Chucks, complete with Friction Counter Shafts, about 6 or 7 years old. Price, each $360.00.

The above are Jones & Lamson make.

Three 8 x 8" Open Type Single Horizontal Belt Driven Air Compressors, with unloaders. Capacity 75 cubic feet air per minute. Each $400.00. Extra for Air Tanks if required.

One No. 2A Warner & Swasey Collet Chucking Machine, complete with Oil Pan, Cross Feed and Counter Shaft. Price, $750.00.

One 20" Engine Lathe x 10', Flather. Price, $650.00

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Engineers, Manufacturers and Founders
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(ctfm)

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You've been going to send in that ad for weeks, so why not mail it now for next week's issue.

Canadian Machinery
143-53 University Ave., Toronto

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There is no reason why it won't do the same for you if you're proposition is of interest to our readers.

Canadian Machinery
Classified Advertising Section
143 University Avenue, Toronto, Ont.

A MAN was wanted as Tool-room Foreman. He was found by a condensed ad. in

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto

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In stock at Moncton, N.B., and offered for sale:—

5—18" x 8' Mueller Engine Lathes.
6—26" x 10' Bertram Lathes.
2—22" x 10' Bertram Lathes.
1—16" x 6' American Toolroom Lathe.
4—3½" x 36" Acme Turret Lathes.
(All modern lathes)
1—No. 2 Kempsmith Universal Milling Machine.
4—6" Hall Cutting-off Machines.

Also

Belting, Shafting, Pulleys, Hangers, Pumps, Air Compressors, Grinders and Furnaces.

For particulars, write or apply at

RECORD FOUNDRY AND MACHINE CO.
Shell Dept.,
MONCTON N. B.

USED MACHINERY

In stock at New Glasgow and offered for sale:

1 "Bullard" lathe 20x12'-0"
1 "Curtis" air hoist 8"x4'-0"
1 "Matheson" hydraulic press 14"x24"
1 "Sturtevant" volume blower, No. 7
1 "Grant" riveting hammer, belt driven (NEW)
1 "Berlin" hardwood flooring planer and matcher, No. 88.

Write for particulars and prices.

I. MATHESON & CO., LTD.
Builders of Machinery
New Glasgow, Nova Scotia
tf

The Financial Post THIS WEEK

ON "OTTAWA'S DUTY TO BUSINESS"

"Let us emphasize the situation. Industry and business are in a good, sound position so far as the present is concerned. It is the future which causes apprehension. We believe that labor and price problems can be solved if other factors for uncertainty are removed and public opinion remains reasonably rational. But capital looks to the Government for some reasonable assurance of fair treatment and until that assurance is given there will be a tendency to mark time. While capital marks time there will not be any industrial progress or general development, because any such expansion requires money. The investor cannot expect to devote his funds to any enterprise which does not give reasonable guarantee as to security and a fair income."

ON THE TARIFF PROBLEMS

"We cannot but conclude that the farmers' great grievance is not the tariff but the combination of financiers and manufacturers; all through the speeches and all through the conversations, that thought continually cropped out. They frankly admitted that a tariff was necessary as a means of raising revenue, and that it might be necessary for the upbuilding of industries based upon Canada's natural resources, but if the tariff was to be used to enable a few groups of manufacturers to extort high prices, then they were prepared to smash the whole tariff.

"This antagonism is not confined to the farmers alone; it is the opinion of the country generally. And the public are not holding the Government blameless. Cabinet Ministers have winked at or frankly supported these supposedly powerful combinations."

Besides the important articles from which the above quotations are made, THE POST this week deals with the following amongst

OTHER SUBJECTS OF INTEREST

Canada Faces Shipbuilding Loss
Outlook for Flour Mills Grows Serious
Textile Mills Have Enlarged Field in Canada
Trade Combines and the Public
Think Profit of Manufacturers Too High
Fewer Changes in Montreal Leases to Take Place
The Mortgage Situation in the Northwest
Toronto Rails Earnings Went Largely to City
Attitude Towards Public Utilities is Bolshevism
Provincial Paper Mills Are Probed
St. Lawrence Mills Again Operating
Cobalt Mining Co. to Acquire a B.C. Property
Detroit United Up $1,500,000. Net Declines
B.C. Permanent Co. Reduced Expenses
Bond Market Was on the Quiet Side During Week
Business Men Settle Police and Fire Terms
Graduated Taxes Are Favored in City of London
Mutual Life Adds 65.5% of New Business
Manufacturers' Life Has Splendid Year
Ukrainians of Canada Want Say in Peace
Banks Discuss Reciprocity as Financial Factor
Reconstruction for Cripples on Economic Lines
Gold and Credit and Problems of Reconstruction

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2 H.P., 550 V., 1700 R.P.M.—1
10 H.P., 550 V., 1200 R.P.M.—9
15 H.P., 550 V., 1200 R.P.M.—2
30 H.P., 550 V., 900 R.P.M.—2
40 H.P., 550 V., 1200 R.P.M.—1
50 H.P., 550 V., 900 R.P.M.—2
75 H.P., 2200 V., 850 R.P.M.—1
125 H.P., 550 V., 690 R.P.M.—1
150 H.P., 550 V., 600 R.P.M.—1
200 H.P., 2200 V., 514 R.P.M.—2
400 H.P., 2200 V., 160 R.P.M.—1

Transformers, Pole Type 2200—$\frac{220}{110}$ Volts

¾ K.W.—11 2¼ K.W.—19
1 K.W.—15 3 K.W.—12
1½ K.W.—26 3¾ K.W.— 6
1 K.W.—24 5 K.W.—55

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MONTREAL STOCK

Motors 3-Phase 60-Cycle

75	H.P.,	550	VOLTS,	450	R.P.M....2
60	H.P.,	550	VOLTS,	450	R.P.M....1
15	H.P.,	550	VOLTS,	1,200	R.P.M....1
10	H.P.,	550	VOLTS,	720	R.P.M....1
7½	H.P.,	550	VOLTS,	720	R.P.M....1
7½	H.P.,	550	VOLTS,	1,800	R.P.M....1
5	H.P.,	550	VOLTS,	720	R.P.M....1
5	H.P.,	550	VOLTS,	900	R.P.M....1
5	H.P.,	550	VOLTS,	1,150	R.P.M....1
5	H.P.,	550	VOLTS,	1,200	R.P.M....3
3	H.P.,	550	VOLTS,	1,200	R.P.M....2
2	H.P.,	550	VOLTS,	1,200	R.P.M....2

TRANSFORMERS....3
200 K.V.A., 2200/2300—14000/15000, 60 Cycles.

550 TRANSFORMERS, POLE TYPE $\frac{220}{110}$ VOLTS
5 K.W.....2
10 K.W.....1

D.C. LIGHTING GENERATOR
10 K.W., 110 VOLTS, 450 R.P.M.....1

RAND AIR COMPRESSOR, 800 F T.....1

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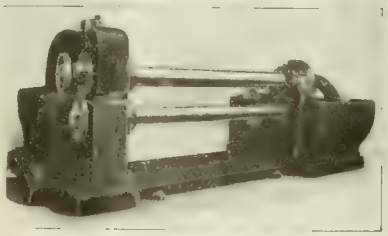
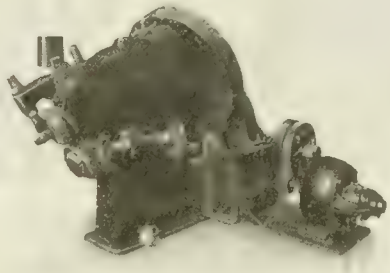
Some New Machines In Toronto Stocks

8 ft. Lennox Double Housing Type, Splitting Shear, capacity ¾-in. belt drive.



This machine is designed for straight shearing of sheets and plates and can be efficiently used for cutting round and square or flat bars.

No. 3 Lennox Rotary Bevel Shear, arranged for belt drive, capacity ¾-in.



The most efficient machine now on the market for beveling irregular and curved sheets, boiler heads, flanges, dome sheets, plates, angles, etc.

LATHES

1 16 x 7' South Bend Screw Cutting Engine Lathe.
1 18 x 8 Ryerson Milwaukee Engine Lathe, 3-step cone, D.B.G., Q.C. feed.
1 24 x 10 Ryerson Milwaukee Engine Lathe, 3-step cone, D.B.G., Q.C. feed.
1 18 x 8 Ryerson Cincinnati Engine Lathe, 3-step cone, D.B.G., Q.C. gear box.
1 20 x 10 Ryerson Cincinnati Engine Lathe, 3-step cone, D.B.G., Q.C. gear box.
1 24 x 12 Lodge & Shipley Engine Lathe, 3-step cone, D.B.G., Q.C. gear box.

MILLING MACHINES

1 Ryerson-Owen No. 3 Universal, belt drive
1 Ryerson-Conradson No. 3 plain, belt drive.

DRILLS

3 20" Ryerson Rockwell.
1 28" Ryerson Sibley Sliding Head.
1 4' Ryerson Radial Drill, Gear Box.
1—24" Ryerson Sibley Sliding Head.
1—30" Ryerson Sibley Sliding Head.

SHEARS AND PUNCHES

1- 8' Lennox, Double Housing Type, Splitting Shear, capacity ¾" belt drive.
1 No. 3 Lennox Rotary Bevel Shear, arranged for belt drive, cap. ¾".
1—Ryerson Steel Frame No. 2 Hand Lever Shear, 6" blades, ¼" capacity.
1 Ryerson Steel Frame No. A-6 Hand Lever Punch, 6' throat, capacity ¼ x ¼.
1 Ryerson Steel Frame No. C-6 Hand Lever Punch, 6" throat, capacity ½ x ½.
1 -Ryerson Steel Frame No. 5-A Hand Lever Punch, 3' throat, capacity ¼ x ¼.
1—Ryerson Steel Frame No. O-A Hand Lever Punch, 3" throat, capacity ¼ x ¼.

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Best and Most Powerful 24" Lathes Made

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Made in Cincinnati by
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14", 16", 18", 24" Lathes

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MACHINERY AND EQUIPMENT of AIRCRAFT DIVISION of

Willys-Overland, Limited, West Toronto, Ontario

SEALED Tenders, accompanied by marked cheque for 5% of the amount of the bid will be received by the undersigned up to and including 12 o'clock Noon, February 22nd, 1919, for the purchase of the following groups of machinery and equipment located at West Toronto, Ontario.

This property consists of machinery, tools, equipment and supplies used in the manufacture, inspection, assembling and testing of the Sunbeam aeroplane engine for the British Government and is one of the best equipped plants in Canada for the production of the highest quality of work. Most of this machinery has only been in use for about a year and a large number of machines are new, some of which have not been removed from their original crates.

GROUP 1. MACHINERY consisting of Lathes, Drill Presses, Milling Machines, Boring Mills, Planers, Shapers, and Miscellaneous Tools.

GROUP 2. ELECTRIC MOTORS, ranging from 5 H.P. to 150 H.P., Induction Type, for 25 cycle current.

GROUP 3. STANDARD SMALL TOOLS, such as Drills, Reamers, Milling Cutters, Measuring Instruments, etc.

GROUP 4. SPECIAL SMALL TOOLS, such as Special Milling Cutters, Reamers, etc.

GROUP 5. COLD ROLLED, TOOL, ALLOY, AND HIGH SPEED STEELS.

GROUP 6. BELTING, new and used.

GROUP 7. PULLEYS, SHAFTING, HANGERS, etc.

GROUP 8. EMERY WHEELS, consisting of a large quantity of both large and small wheels.

GROUP 9. BLACKSMITH and **HARDENING ROOM EQUIPMENT.**

GROUP 10. ELECTRO-PLATING DEPARTMENT EQUIPMENT.

GROUP 11. LABORATORY EQUIPMENT suitable for Metallurgical determination and tests, including Brinell Machine, Izod Impact Machine, Chemicals and other laboratory apparatus.

GROUP 12. FOUNDRY EQUIPMENT.

GROUP 13. STANDARD SCREWS, Machine Bolts, Washers and other fastenings generally used in a manufacturing plant.

GROUP 14. PLUMBERS' AND STEAMFITTERS' SUPPLIES, suitable for plant maintenance.

GROUP 16. ELECTRICAL EQUIPMENT AND SUPPLIES, used for maintenance of power and lighting circuits.

GROUP 17. MISCELLANEOUS EQUIPMENT, divided into the following subdivisions:—

(a) Tables.
(b) Vises.
(c) Blocks, Cranes and Hoists.
(d) Gasoline and Oil Tanks.
(e) Cupboards for tools.
(f) Benches with cast iron bench legs.
(g) Metal Tote Pans.
(h) Wire grill work.
(i) Electric Drills and other special equipment such as National Counting Machines, Shaft Aligning and Levelling Outfit, etc.
(j) Transformers, Electric Trucks and other trucks.
(k) Time Clocks.
(l) Welding Outfit, Matthews Gravity Carrier, Battery Charging Set, Cloak Room Equipment, Fire Extinguishers.

GROUP 18. CAFE EQUIPMENT AND SUPPLIES.

GROUP 19. SHEET AND ROD BRASS.

GROUPS 20 to 28. Comprising **ZINC, TIN, LEAD, BABBITT AND BRONZE, IRON, STRUCTURAL STEEL, COPPER, NAILS, HINGES.**

GROUP 29. IRON CASTINGS and **ALUMINUM.**

GROUP 30. TUBING.

GROUP 31. FILES.

GROUP 32. GENERAL SHOP SUPPLIES, such as Hack Saws, Emery Cloth, Glass, etc.

GROUP 33. MISCELLANEOUS SUPPLIES, consisting of Brushes, Packing, Acids, Oils and Supplies for general plant use.

GROUP 34. WEIGHING SCALES.

GROUP 35. OFFICE FURNITURE and **EQUIPMENT,** such as Desks, Typewriters, Adding Machines and Hospital and Rest Room Furniture.

GROUP 36. DYNAMOMETER EQUIPMENT, consisting of eight 200 H.P. Sprague Electric Dynamometers with all necessary electrical apparatus and equipment for testing engines.

GROUP 37. DRAFTING ROOM and **ENGINEERING EQUIPMENT,** consisting of Drafting Tables, Blue Print Machine, Photostat Machine, etc.

Tenders for all groups except Nos. 1, 2, 3, 4, 17, 35, 36 and 37 will be received only for each group as a whole. In the case of Groups Nos. 1, 2, 3, 4, 17, 35, 36 and 37, tenders will be received either in whole or in part.

The buyers will dismantle and load on cars, and bids are to be made on this basis.

Intending purchasers will be given every facility to inspect the machinery and equipment. Complete information may be obtained from the Willys-Overland, Ltd., Aircraft Division, West Toronto, Ontario.

The highest or any tender not necessarily accepted. Cheques for unsuccessful bidders will be promptly returned.

Tenders should be addressed to

IMPERIAL MUNITIONS BOARD

Care of Aircraft Division

WILLYS-OVERLAND, LIMITED

WEST TORONTO, CANADA

SPECIAL MACHINERY

Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

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ALL EQUIPMENT REQUIRED FOR RAPID AND ECONOMICAL PRODUCTION OF INTERCHANGEABLE PARTS. PROMPT ATTENTION TO ALL WORK.

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Telephone us the minute you have a breakdown, and the next train will bring our

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Long Distance Phone Main 5779
Nights: Westmount 3483
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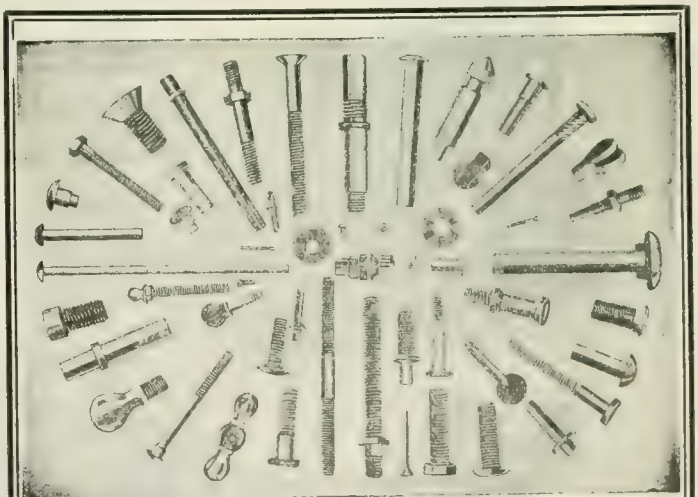
HALIFAX, N.S. 2



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Our Mechanical Engineers are at the service of our Clients.

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FOR TRUEING GRINDING WHEELS

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Sole Canadian Agents for
THE JOYCE-KOEBEL COMPANY, INC.
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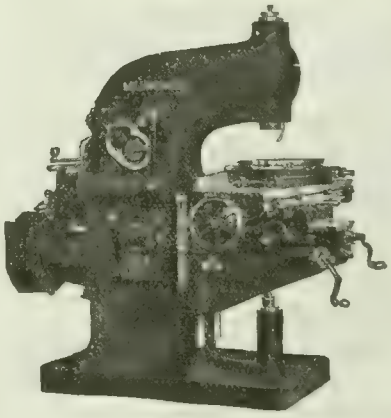
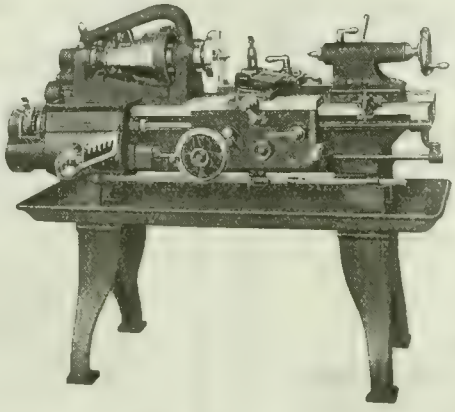
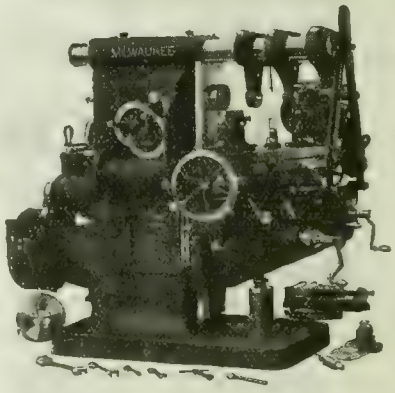
WILLIAMS & WILSON, LIMITED

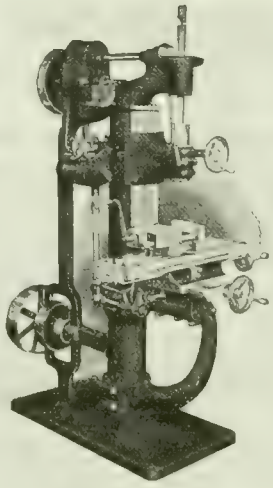
Cable Address "Willwills" Montreal, P.Q. Established 1891

Tool Room Machinery







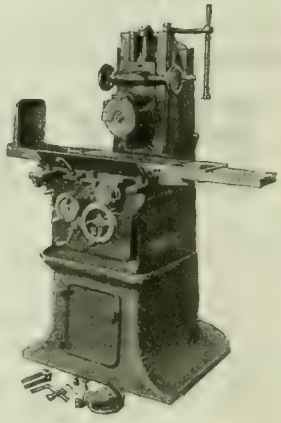


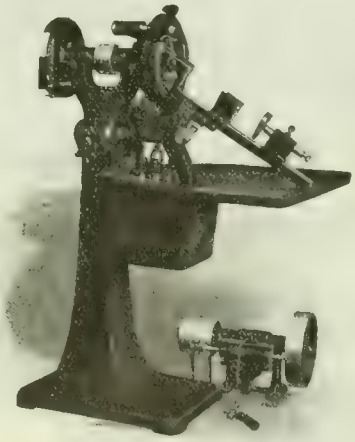
For those interested in advanced methods of

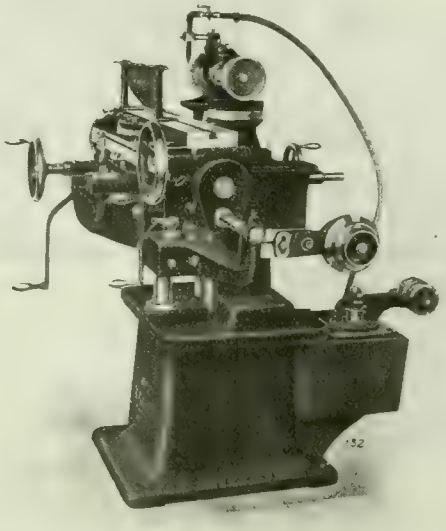
Modern Tool Room Equipment

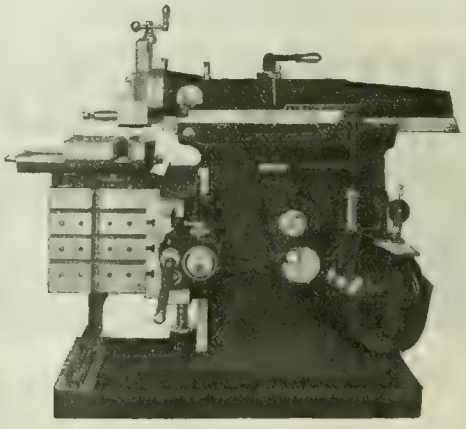
we have machines of the highest grade and efficiency for every description.

Let us give you full particulars and quotations. Write to us to-day.









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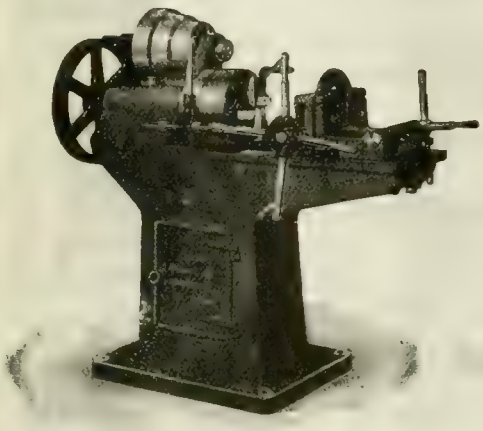

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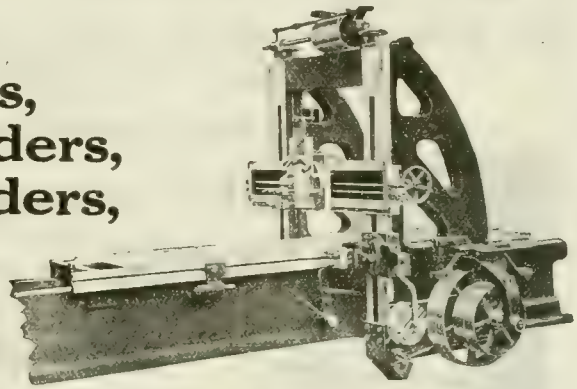
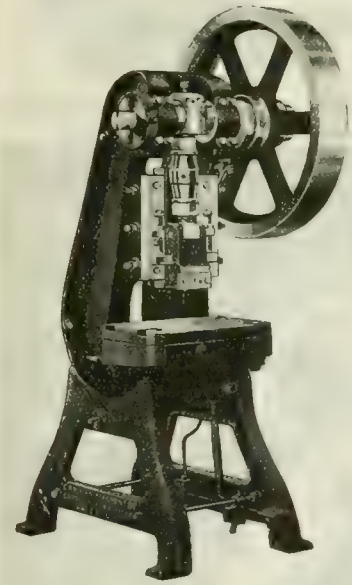
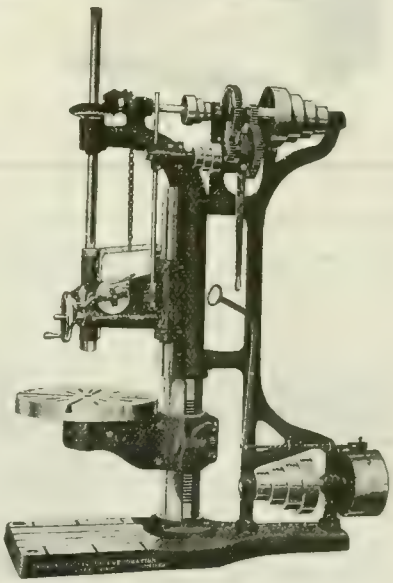
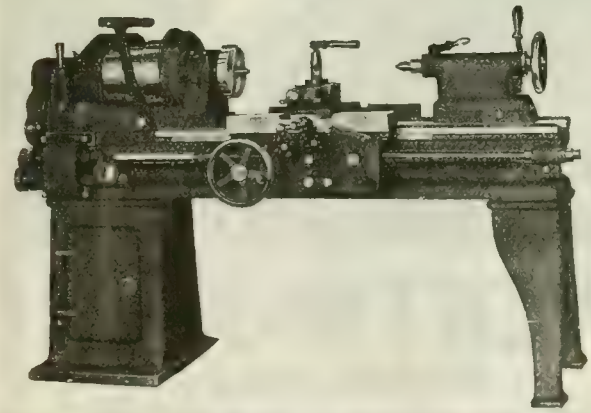


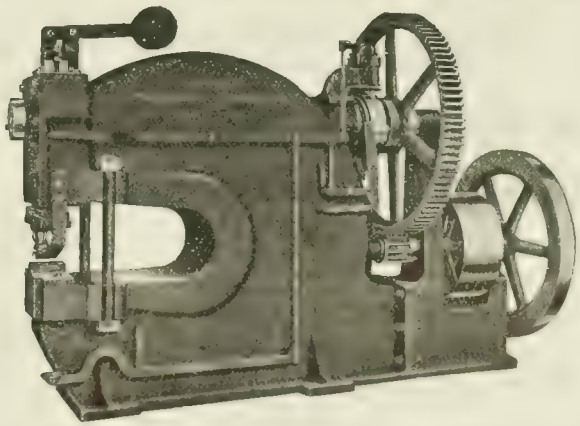


Send us a list of your requirements and we will gladly give you prices and deliveries on:

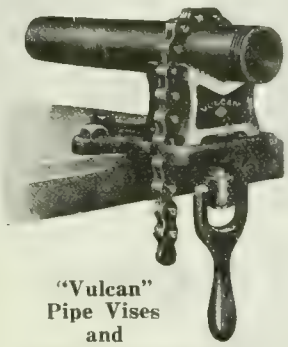
Lathes, Planers, Shapers, Milling Machines, Grinders, Radial Drills, Drill Presses, Boring Mills, Grinders, Turret Lathes, Keyseaters, Screw Machines, Bolt Cutters, Slotters, Pipe Machines, Punching and Shearing Machines, etc., etc.







Williams & Wilson Limited.—*Where the Best in Service Meets the Best in Machinery*



"Vulcan" Pipe Vises and Pipe Wrenches

Machine Shop, Foundry and Construction Supplies

In addition to the tools shown, our line includes Set Screws, Cap Screws, Machine Screws, High Speed and Carbon Drills, Files (extra large stock) and a complete line of machinists' tools (Starrett, Brown & Sharpe, etc.).

We also carry a heavy stock of **Bar Iron, Sheet Iron (black and galvanized), Machine Steel, Cast Steel, High Speed Steel, Cold Rolled Steel, etc.**

Pleased to quote prices and time of delivery.

B. & S. Micrometers

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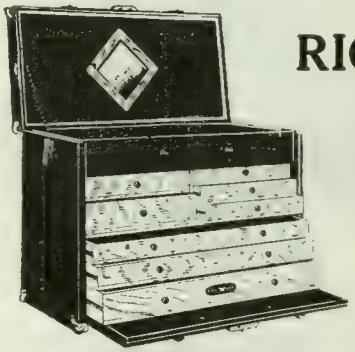

Machinists' Tool Chests

RICE LEWIS & SON, LIMITED

Established 1847 19 Victoria Street

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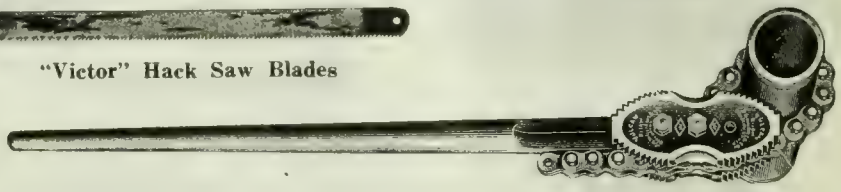
"Victor" Hack Saw Blades



STOP thefts of coal, material, castings, stock, etc., protect your plant and property against incendiaries, hoodlumism and cranks by erecting a seven-foot-high, barbed-wire topped, heavy steel wire fence.

DENNIS
Chain Link Fence

is made expressly for the one purpose of surrounding plants with a safety zone beyond which none may pass.
Centralized entrances in this impassable wall of woven steel give you searching scrutiny of everyone entering. We have made many big Canadian plants SAFE in the last few months—at moderate cost. Write for folders.

THE DENNIS WIRE AND IRON WORKS CO. LIMITED
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"Wanted—A National Plan"

An article of unusual importance, by Sir George Bury, formerly vice-president of the C.P.R., appears in the February issue of MACLEAN'S. He points out that Canada must more definitely shape her destiny if that destiny is to be as glorious as all Canadians hope. It is a stirring demand for Canadians to get together in the formation of a national plan, accompanied by many practical suggestions from his experience in transcontinental railroad building. An article of national importance.

"Germany From Within To-day"

The funniest thing that he has perhaps written appears in February MACLEAN'S from the pen of Canada's great humorist, Stephen Leacock—an imaginary visit to Berlin under the Bolsheviks. He finds Von Tirpitz planning a new navy, an *inland fleet;* Frau Krupp, an apple woman; Von Bethmann-Hollweg, a cab driver; Bernstorff, a Bolshevik and president of the Scavengers Union. He finds a *Get From Under* committee planning a trade war on the world and half the population of Berlin in English clothing or Scotch kilts. He finds—

But read the article. There's a long laugh in every line. It is farce, however, built up on pretty shrewd truths.

You will find this a remarkably interesting number. The bold, fighting face of Admiral Beatty is on the cover and inside are the following big features:

The Campaign Against Britain, by Agnes C. Laut.
The Farmer in Politics, by J. K. Munro.
The Strange Adventure of the Thumb Tap Clue, by Arthur Stringer.
Old Times in Canada, by Walt Mason.
Lend Me Your Title, by Onoto Watanna.
The Three Sapphires, by W. A. Fraser.
Wild Miners I Have Met, by E. Ward Smith.
The Anglicization of Katrina, by Mary Josephine Benson.
Saturday's Child, by Mary E. Lowrey.
The Minx Goes to the Front, by C. N. and A. M. Williamson.
The Veins of the War God, by Corporal Herbert Forder.

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Galt Ont.

GREY The KA—TIE Trade Mark Foundry IRON

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These are our SPECIAL LINES. But at this time we are prepared to handle contract work up to 15 tons per day. For gated pattern, match plate, stripping plate, machine and repetition work of any kind we are prepared to quote you most attractive prices and prompt delivery.

Would You Like to Know

the analysis and physical test of metal in your castings? How they could be made cheaper? What properties of metal would facilitate your finishing operations or improve their quality?

We can furnish semi-finished Castings, being equipped to do lathe drilling and reaming work—also expert metal pattern work.

Ask Us

"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.

Marshalltown, Iowa
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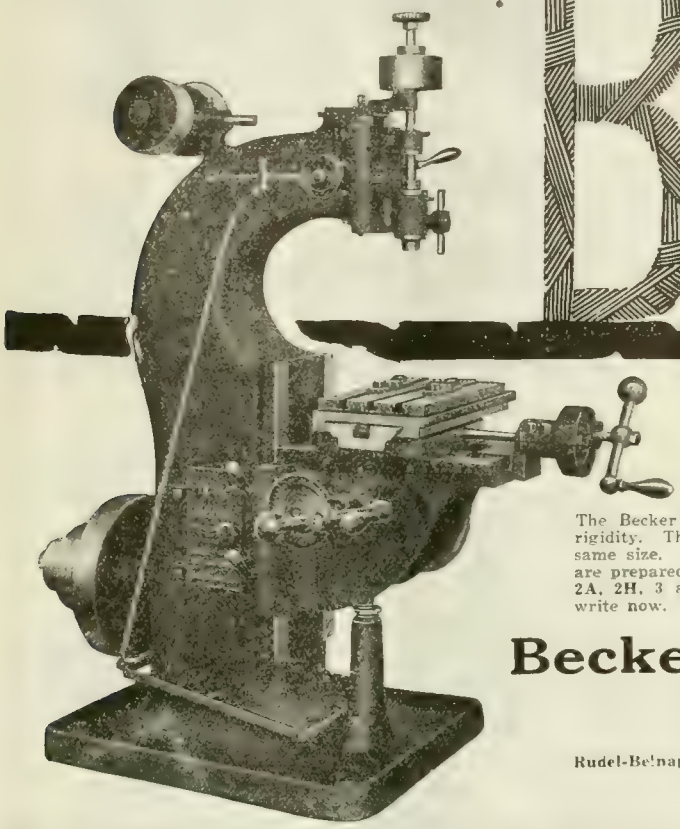
Becker Belt-Driven Millers
—The Machines that Give the Smooth Finish

BECKER



Why You Should Select This Milling Machine

The Becker Miller has many exclusive features which give it matchless speed and rigidity. Then it requires one-third to one-half less power than other millers of the same size. QUICK DELIVERIES—another feature of Becker Machines; in fact we are prepared to ship upon receipt of your order any of the following sizes: **No. 1, 2, 2A, 2H, 3 and 4B.** Any information you may require will be gladly furnished write now.

Becker Milling Machine Co.
Hyde Park, Boston, Mass.

Canadian Agents:
Rudel-Belnap Machinery Company, Ltd., 137 McGill St., Montreal; A. R. Williams Machinery Company, Ltd., 64 Front St. West, Toronto.

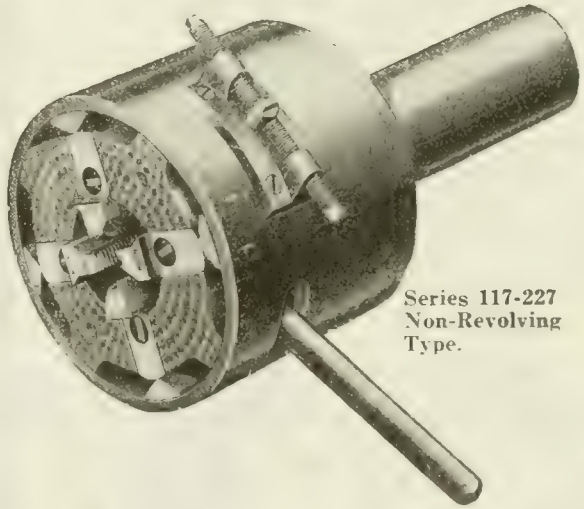
NAMCO AUTOMATIC SELF-OPENING DIES

Cut threads rapidly and accurately.

Strong construction of head, correct chasers, positive opening action mean continuous production.

Time saved in threading means increased output of finished pieces.

Quotations on Your Work?
Send for Catalog T-D



Series 117-227 Non-Revolving Type.

THE NATIONAL ACME COMPANY

NEW ENGLAND PLANT. WINDSOR, VERMONT

CLEVELAND, OHIO, U.S.A.

CANADIAN PLANT. MONTREAL, P.Q.

Branch Offices: NEW YORK, BOSTON, CHICAGO, DETROIT, ATLANTA, SAN FRANCISCO
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Makers of Gridley Single and Multiple-Spindle Automatics at Windsor, Vermont, and Acme Automatics, Threading Dies, Collapsing Taps and Screw Machine Products at Cleveland, Ohio

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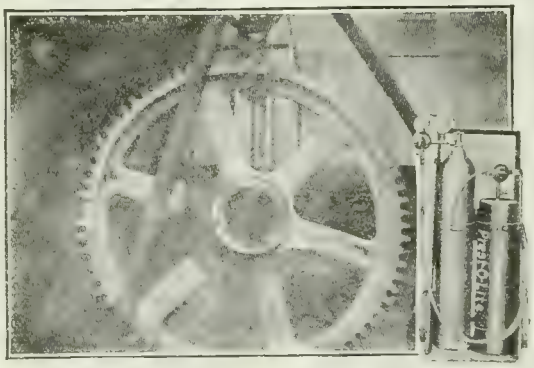

This Expensive Gear Wheel Reclaimed at Trifling Cost

This Gear Wheel, in a large plant at St. Catharines, was broken recently. To replace it would have taken much valuable time and represented quite a serious expense.

A local Prest-O-Lite operator was called in and undertook to repair the casting in record time at trifling cost.

The work was done by the job welding department of the International Garage, St. Catharines, Ont., and has given complete satisfaction.

Prest-O-Lite Oxy-Acetylene Welding is proving a great economic factor in the factories, mills, railroads, mines and machine shops of Canada.

Prest-O-Lite PROCESS

employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene is backed by Prest-O-Lite service, which insures prompt exchange of full cylinders for empty ones; provides dry, purified gas, insuring better welds, quicker work and lower operating cost.

Apparatus consists of an equal pressure blow pipe, automatic regulators and gauges, and all necessary equipment. Adaptable for oxy-acetylene cutting by the addition of special cutting blowpipe.

Thorough instructions are furnished free to every user of Prest-O-Lite Dissolved Acetylene. Any average workman who understands metals can learn the welding process quickly and easily.

We will gladly send illustrated literature and interesting data showing actual instances of savings made by others. It may suggest valuable ideas to you. Write for it.

Address Department C—107

Prest-O-Lite Company of Canada, Limited

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Plants at: Toronto, Ont. Merritton, Ont.
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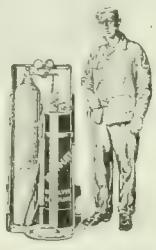


World's Largest Makers of Dissolved Acetylene

Williams' "Agrippa" Tool Holders

"THE HOLDERS THAT HOLD"

FOR nearly half a century we have been designing and making drop-forgings and drop-forged tools. Our trade-marks, "Vulcan" and ⟨W⟩ and "Agrippa" are known throughout the world wherever machinery and tools are used; they represent our constant endeavor to maintain and improve quality—to put *Superior* into our product—to make it individual and worthy of the high standard long established for Williams' goods.

Williams' "Agrippa" Tool Holders are a case in point. They embody all the improvements in design, material and practice suggested by experiment with former models. No pains or expense that will add to their efficiency is spared in their manufacture. Many of their features are unique and make for economy and convenience. A full line in a wide range of sizes is carried for various classes of work, including

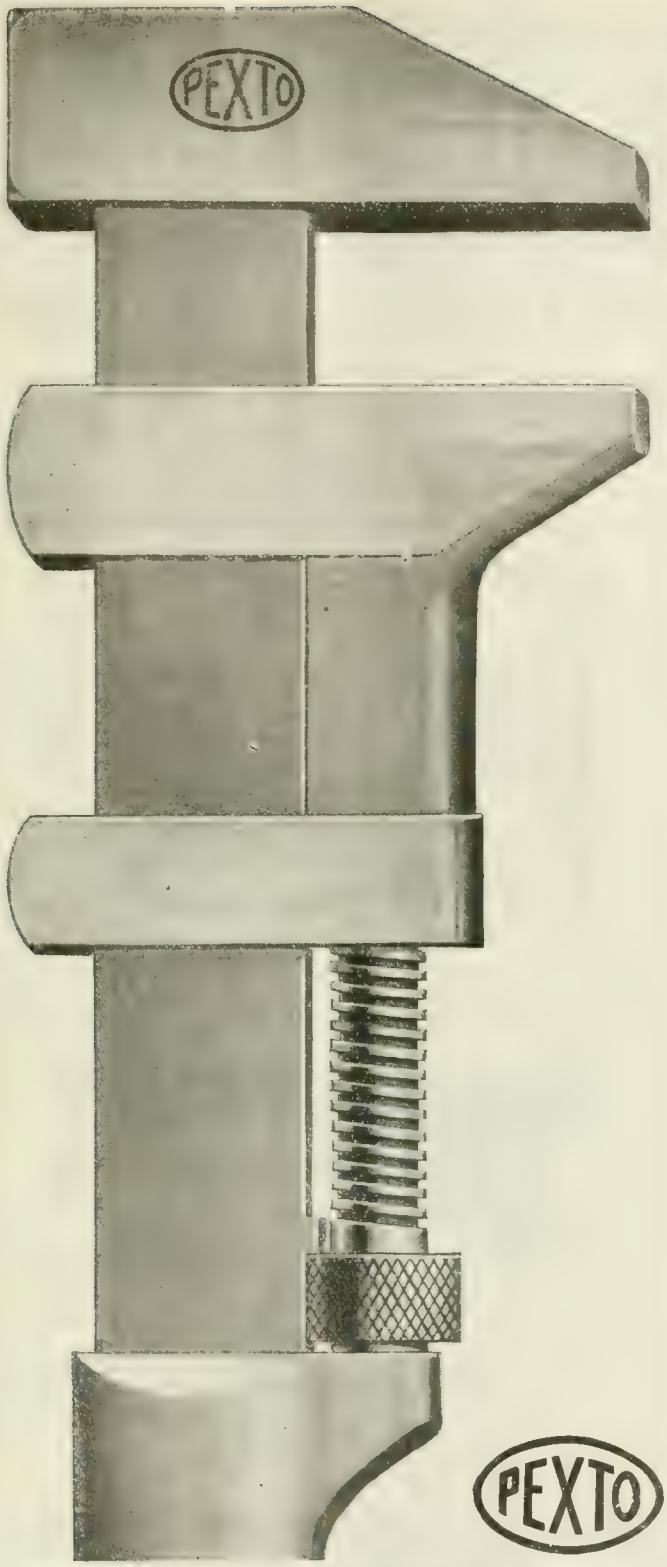
Turning	**Boring**	**Threading**
Planing	**Cutting-off**	**Knurling**
	Side Work	

These tools, as well as Lathe Dogs, Clamps, Caliper Gauges, etc., are all described in our Machinists' Tools Booklet—free on request.

J. H. Williams & Co.

"The Drop-Forging People"
45 Richards Street, Brooklyn N.Y.

The A. G. LOW CO., LTD.,
45 Pacific Ave., Saskatoon, Sask.
Agents for Manitoba, Saskatchewan, Alberta and British Columbia.



The Pexto Solid-Steel No. 300 Wrench

Pexto Catalog 1417 says:

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Engineers and skilled mechanics by critical tests have proved the truth of this.

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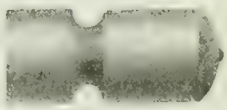

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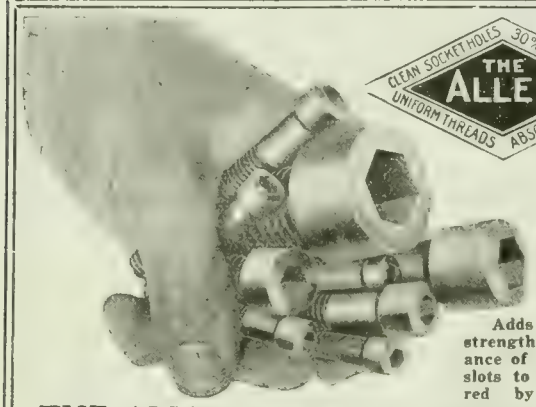

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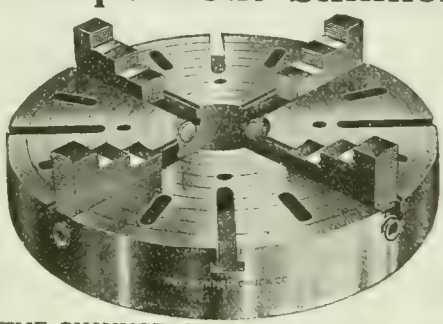

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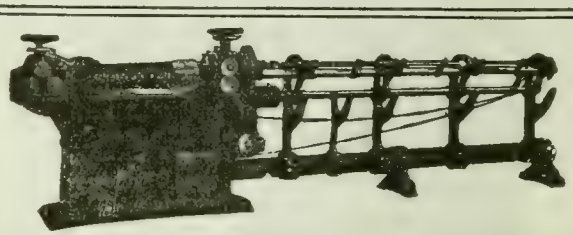

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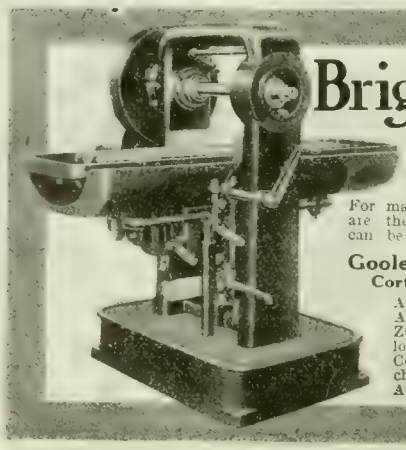

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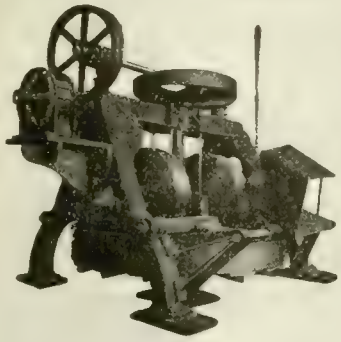

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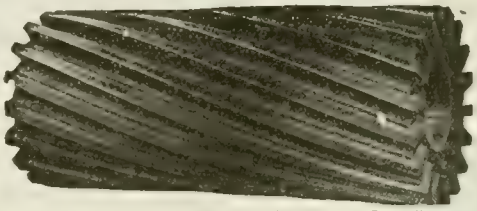

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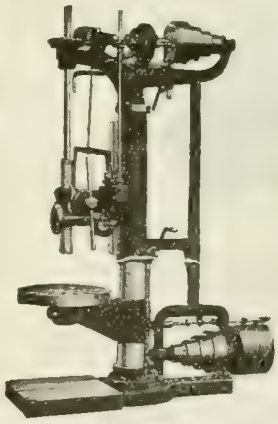

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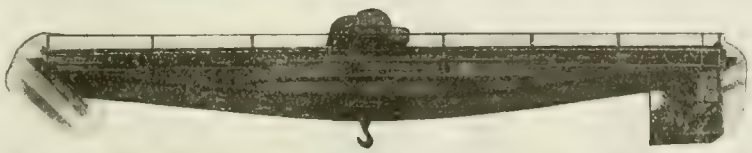

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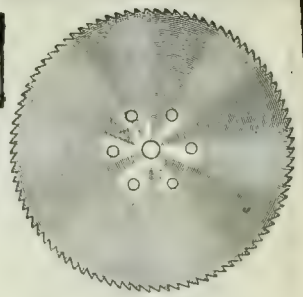

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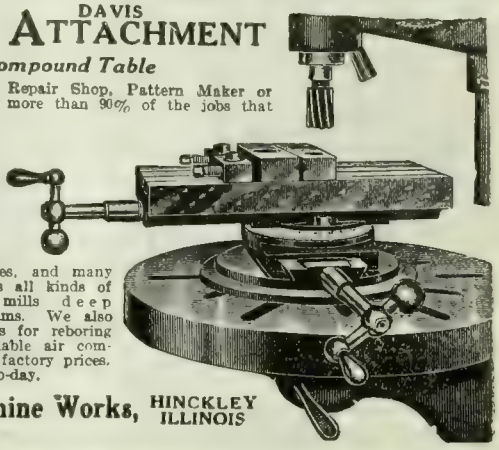

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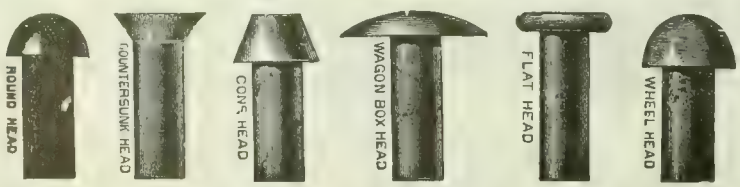

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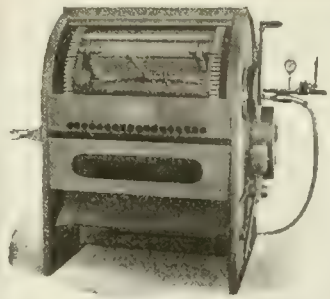

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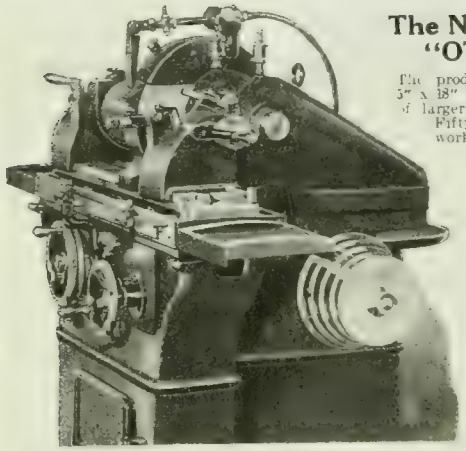

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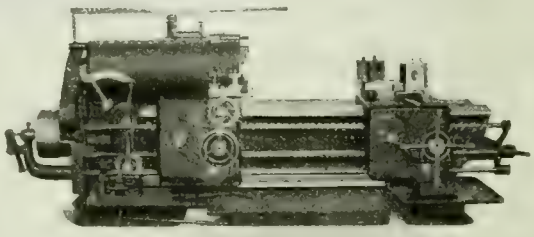

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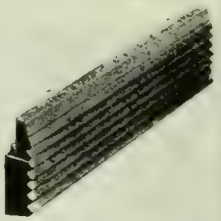

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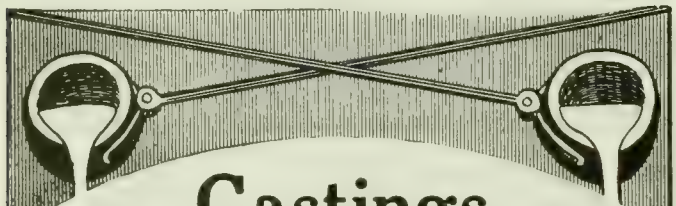

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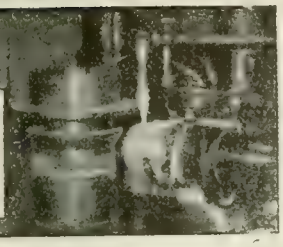

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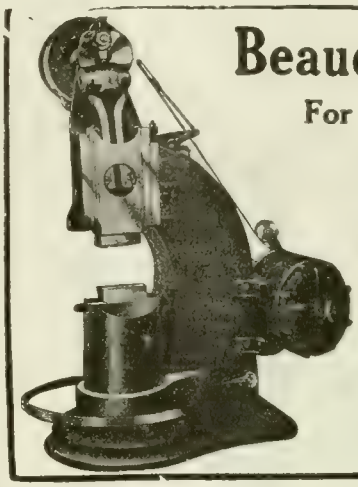

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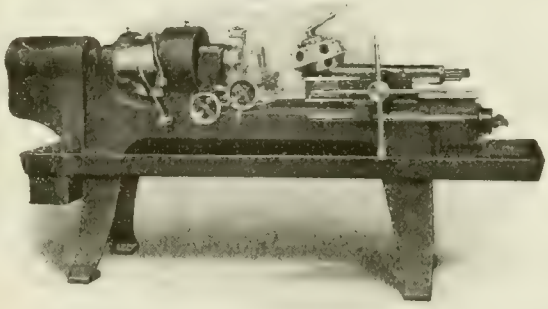

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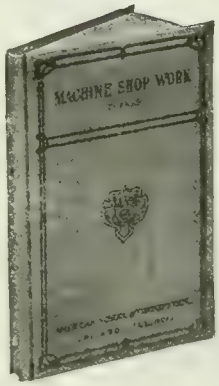

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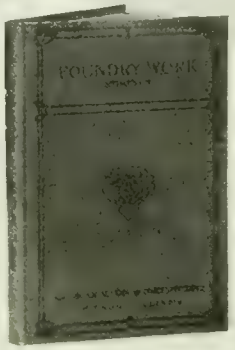

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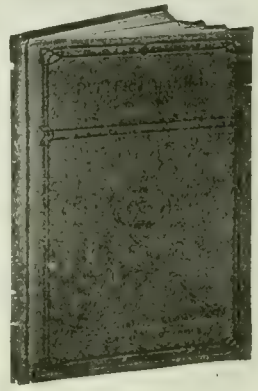

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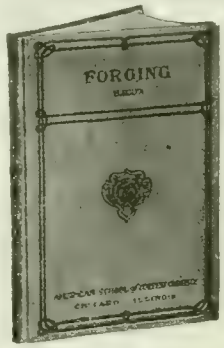

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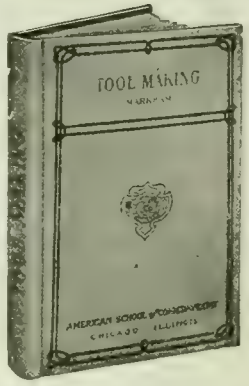

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Marsh Engineering Works, Ltd., Belleville, Ont.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
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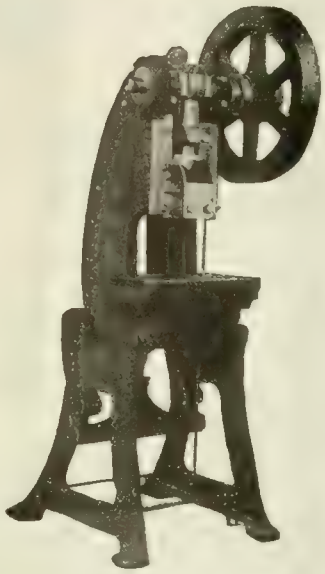

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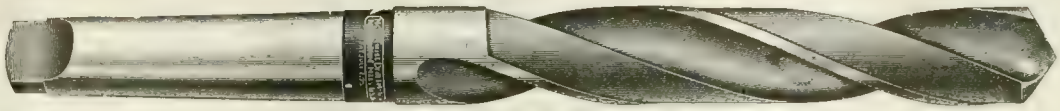

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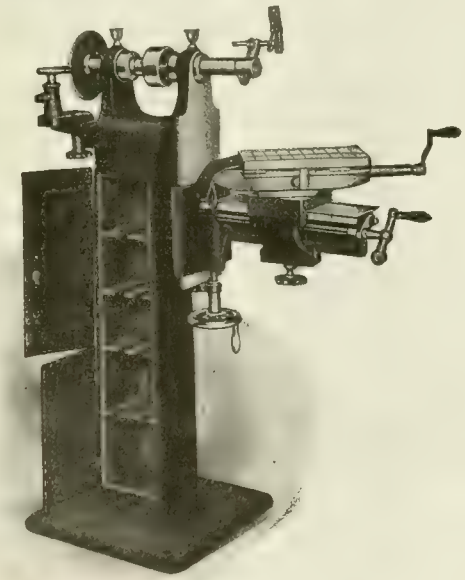

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Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago.
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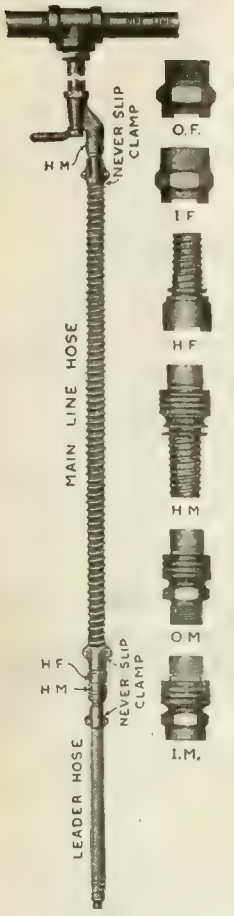

Bowes Automatic Air Hose Couplings
Over 1,500,000 in general use

STYLE O.F. is an Outside Thread Female Pipe End. Made in sizes ⅜-inch to 1½-inch.
STYLE I.F. is an inside Thread Female Pipe End. Made in sizes ¼-inch to 1½-inch.
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The Male and Female Ends of Bowes Couplings interchange in sizes, ¼-in. to ¾-in. Sizes 1-in. and 1¼-in. interchange. The 1½-in. ends interchange only with themselves.

BOWES COUPLINGS
Are instanly connected or disconnected.
They are absolutely air-tight under all pressures.
They quickly pay for themselves by stopping costly leaks.
They interchange in sizes most commonly used.
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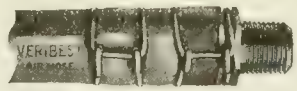
They are made of brass and will not rust.
TheU-shaped Gasket interchanges in couplings ¼-in. to ¾-in.

The Cleco Never Slip Hose Clamp
Made in same sizes as Bowes Couplings

The adjoining cut of Cleco Never Slip Hose Clamp shows the "Flanges" which engage the groove provided in all hose ends of Bowes Couplings. The "Model Hose Line" illustrated shows correct styles of couplings and valve to use and proper way to attach the clamps.

CLECO GROOVED HOSE NIPPLE



Grooved Nipples when attached to hose with the wire clamp cannot "blow-out," as one-half of the Wire Clamp lies in Nipple Groove, and the other half on the hose, uniting nipple and hose permanently.

WIRE CLAMP TOOL

To apply Wire Clamps to Grooved Hose Nipples you need the Wire Clamp Tool illustrated, a small hand-operated tool at moderate cost which we carry in stock for immediate delivery. In Stock: Riveting and Chipping Hammers, Four-piston Air Drills, Corner Drills, Emery Grinders, Sand Rammers, Holder Ons, etc.

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IMPORTANT:—The Small Leaks in your "AIR LINE" mean serious loss in DOLLARS. Have you any idea of the amount of "Air" wasted in small leaks at your connections? Air Leakage through 1-16 in. opening equals 5.32 cu. ft. per minute at 80 lbs. It will pay you to install Bowes Couplings and stop costly leaks.

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Weight	**40,000 lbs.**
Rated Horse Power	**625**
I. H. P.	**700**
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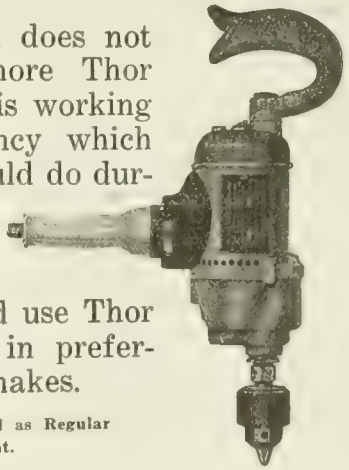

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Warner & Swasey, Cleveland, O.
Garvin Machine Co., New York.

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Canada Foundries & Forgings, Ltd., Welland, Ont
Rice, Lewis & Son, Toronto, Ont.

TURNTABLES
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Brown, Boggs Co., Ltd., Hamilton, Canada.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can
National Machy. Co., Tiffin, O.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que

VALVE LEATHERS
Graton & Knight Mfg. Co., Montreal.

VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto

VALVES, HYDRAULIC
Metalwood Mfg. Co., Detroit, Mich.

VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.

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Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
A. R. Williams Machy. Co., Toronto.

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New Britain Machine Co., New Britain, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

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Aikenhead Hardware Co., Toronto, Ont.
Becker Milling Machine Co., Boston, Mass.
The Geo. F. Foss Mchy. & Supply Co., Montreal
New Britain Machine Co., New Britain, Conn.

VISES, PIPE
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Butterfield & Co., Rock Island, Que.
Wells Bros. Co. of Canada, Galt, Ont.
J. H. Williams & Co., Brooklyn, N.Y.

VISES, PLANER AND SHAPER
Aikenhead Hardware Co., Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.

WASHER MACHINES
National Machy. Co., Tiffin, Ohio.

WASHERS
Barnes, Wallace, Co., Bristol, Conn.
Graton & Knight Mfg. Co., Worcester, Mass.
London Bolt & Hinge Works, London, Ont
Steel Co. of Canada, Ltd., Hamilton, Ont.

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United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wood Turret Machine Co., Brazil, Ind

WATER-INTAKE SCREENS
Can. Link-Belt Co., Toronto, Ont.

WATER TOWERS
Toronto Iron Works, Ltd., Toronto.

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Anderson & Co., of Canada, Geo., Montreal, Que.
Wheel Trueing Tool Co., Windsor, Ont.

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Kennedy & Son, Wm., Owen Sound, Ont.
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Page Steel & Wire Co., New York.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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Boker & Co., Inc., H., Montreal, Que.

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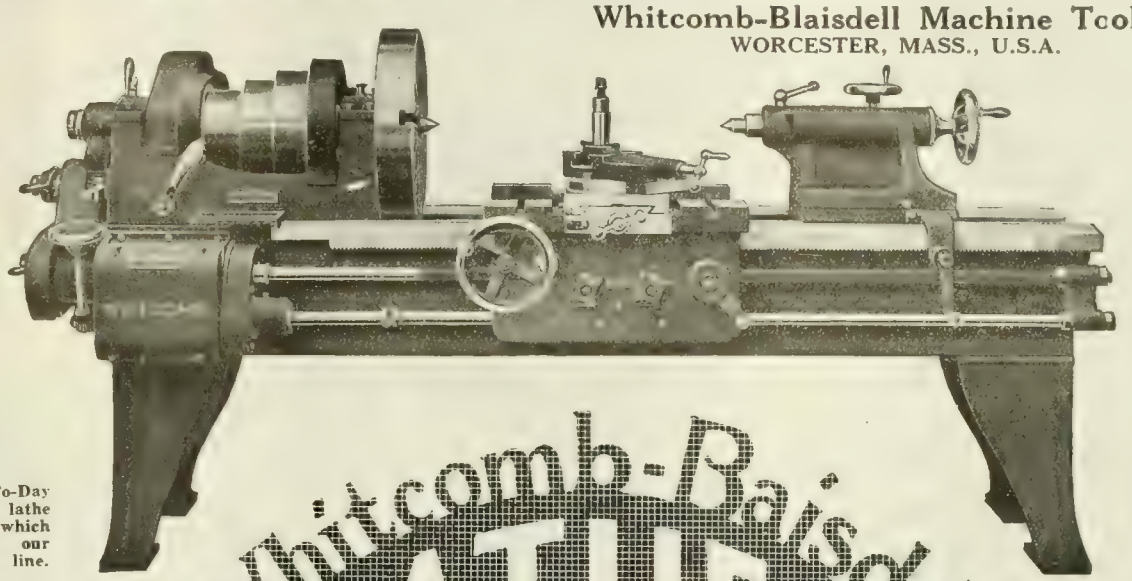

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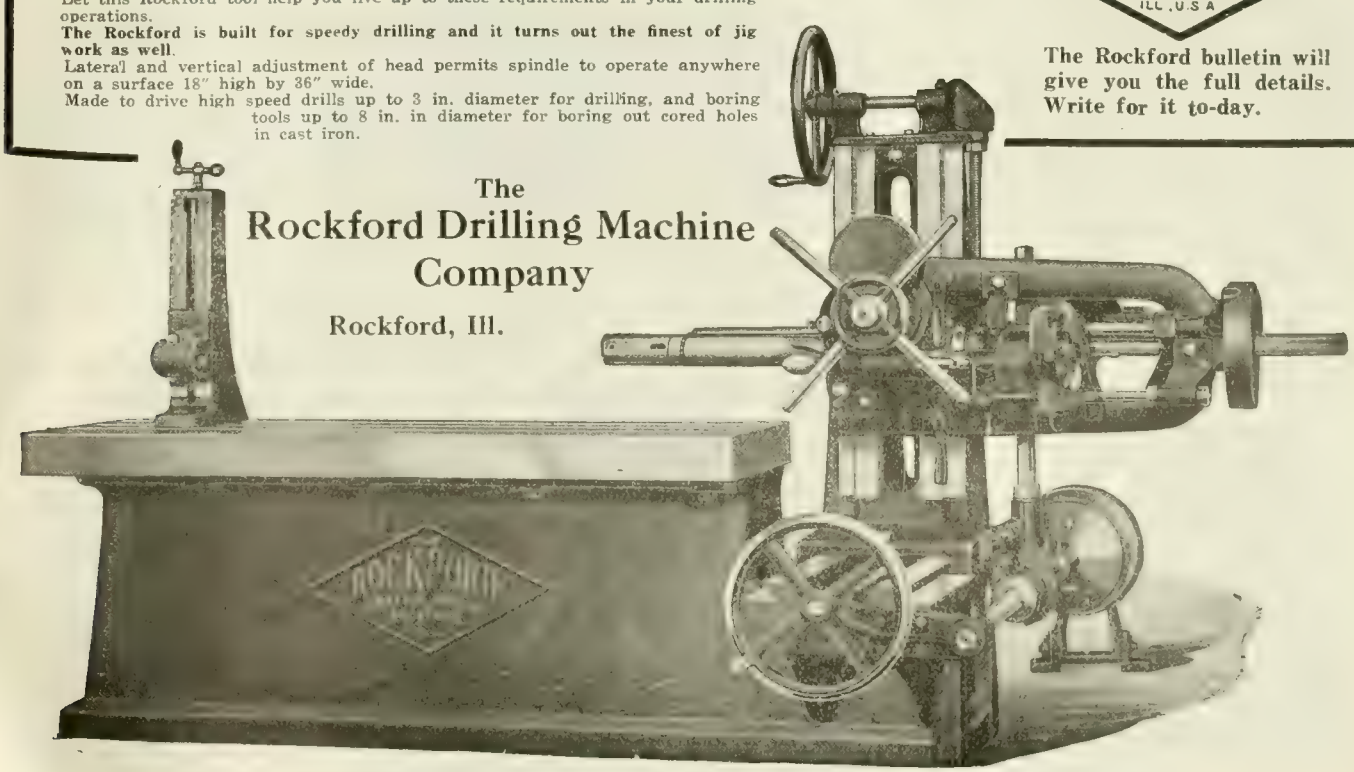

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Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BALING
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PRESSES, POWER
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E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
William R. Perrin, Ltd., Toronto.
Riverside Machinery Depot, Detroit, Mich.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SPRING FOOT
Bliss Co., E. W., Brooklyn, N.Y.
Brown Boggs & Co., Hamilton, Ont.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, SCREW
Barnes, W. F., & John Co., Rockford, Ill
Bliss Co., E. W., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J
William R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING
Bliss Co., E. W., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Erie Foundry Co., Erie, Pa.
Ferracute Mach. Co., Bridgeton, N.J
Stoll Co., D. H., Buffalo, N.Y.

PRODUCTION WORK
Windsor Mach. & Tool Co., Windsor, Ont.

PROPELLERS
Kennedy & Sons, Wm., Owen Sound, Ont.

PSYCROMETERS, SLING
Taylor Instrument Co., Rochester, N.Y.

PULLEYS
Algoma Steel Corp., Sault Ste. Marie, Ont.
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
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Brown & Sharpe Mfg. Co., Providence, R.I.
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Ford-Smith Machine Co., Hamilton, Ont.
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A. R. Williams Machy. Co., Toronto.
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Positive Clutch & Pulley Works, Ltd., Toronto
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Pratt & Whitney Co., Dundas, Ont.
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The Kelly Reamer Co., Cleveland, O.
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Wells Bros. of Can., Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
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Cleveland Twist Drill Co., Cleveland.
Kelly Reamer Co., Cleveland, O.
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Pratt & Whitney Co., Dundas, Ont.

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Baxter & Co., Ltd., J. R., Montreal, Que.
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Butterfield & Co., Rock Island, Que.
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Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
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Greenfield Tap & Die Corp., Greenfield, Mass.
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Wells Bros. of Can., Galt, Ont.

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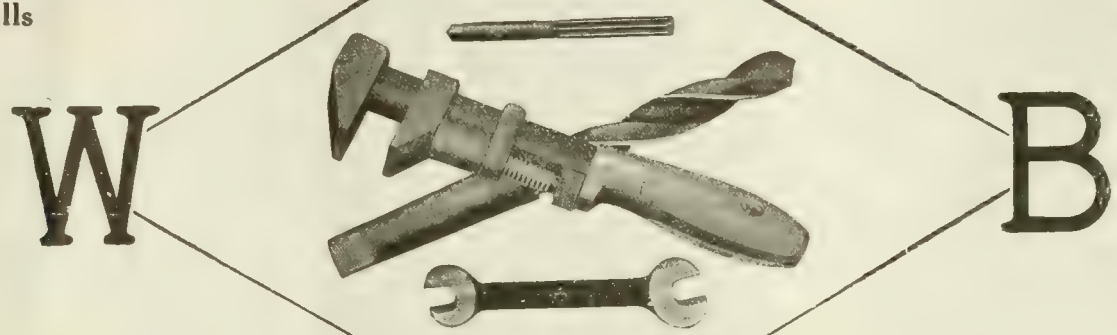

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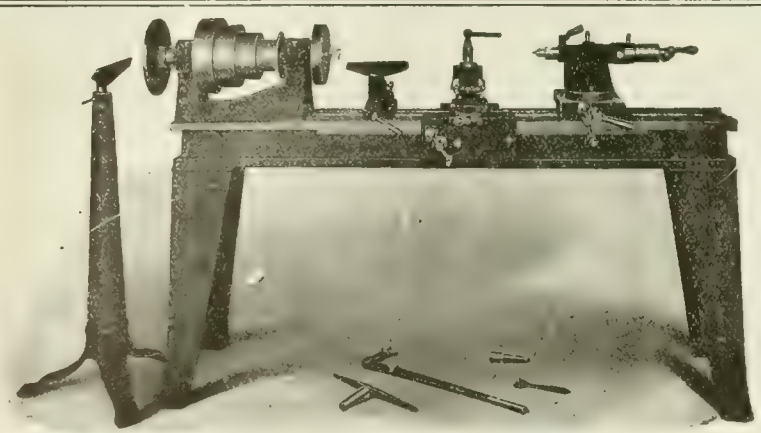

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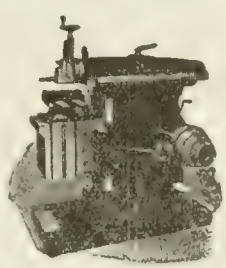

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Niles-Bement-Pond Co., New York.
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Garlock-Walker Machinery Co., Toronto, Ont.
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Stoll Co., Inc., D. H., Buffalo, N.Y.
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Plewes, Ltd., Winnipeg, Man.
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Butterfield & Co., Rock Island, Que.
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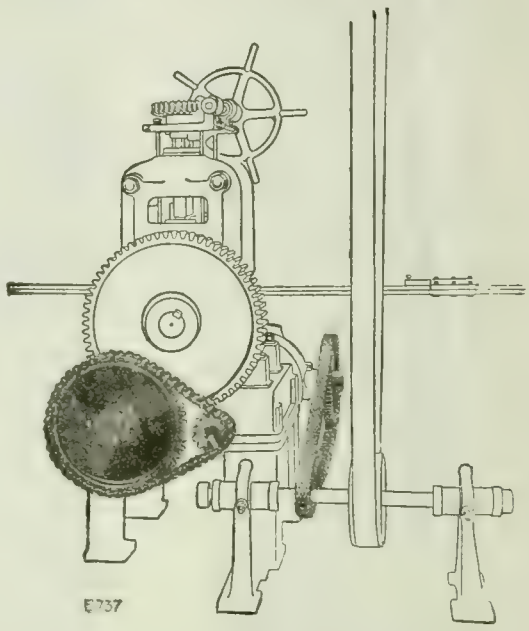

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EDITORIAL CONTENTS

WHAT GERMANY EXPORTED TO CANADA IN 1914 155

EXECUTIVE COMMON-SENSE IN THE WORKSHOP 157

MANUFACTURING THE WHITLOCK PONY PRESS 159

STRENGTH OF CAST IRON IN BENDING 162

WHAT OUR READERS THINK AND DO 164

DEVELOPMENTS IN SHOP EQUIPMENT 166

EDITORIAL 168

MARKET DEVELOPMENTS 170

Summary....Montreal Letter....Toronto Letter....Pittsburgh Letter....New York Letter.

SELECTED MARKET QUOTATIONS 175

INDUSTRIAL NEWS 56

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JOHN BAYNE MACLEAN, Pres. H. T. HUNTER, Vice-pres. H. V. TYRRELL, Gen. Man.

Publishers of Hardware and Metal, The Financial Post, MacLean Magazine, Farmers' Magazine, Canadian Grocer, Dry Goods Review, Men's Wear Review, Printer and Publisher, Bookseller and Stationer, Canadian Machinery and Manufacturing News, Power House, Sanitary Engineer, Canadian Foundryman, Marine Engineering of Canada.

Cable Address. Macpubco, Toronto; Atabek, London, Eng.

ESTABLISHED 1887.

CANADIAN MACHINERY AND MANUFACTURING NEWS

A. R. KENNEDY, Managing Editor. B. G. NEWTON, Manager.

Associate Editors: J. H. RODGERS, W. F. SUTHERLAND, T. H. FENNER.

Eastern Representative: H. V. Tresidder; Ontario Representative: S. S. Moore; Toronto and Hamilton Representative; J. N. Robinson.

CHIEF OFFICES:

CANADA—Montreal, Southam Building, 128 Bleury Street, Telephone 1004; Toronto, 143-153 University Ave., Telephone Main 7324; Winnipeg, 1207 Union Trust Building, Telephone Main 3449.

GREAT BRITAIN—LONDON, The MacLean Company of Great Britain, Limited, 88 Fleet Street, E.C., E. J. Dodd, Director. Telephone Central 12960. Cable address: Atabek, London, England.

UNITED STATES—New York, A. R. Lowe, Room 620, 111 Broadway, N.Y., Telephone Rector 8971; Boston, C. L. Morton, Room 733, Old South Building, Telephone Main 1204. A. H. Byrne, Room 900, Lytton Bldg., 14 E. Jackson Street, Chicago, 'Phone Harrison 1147.

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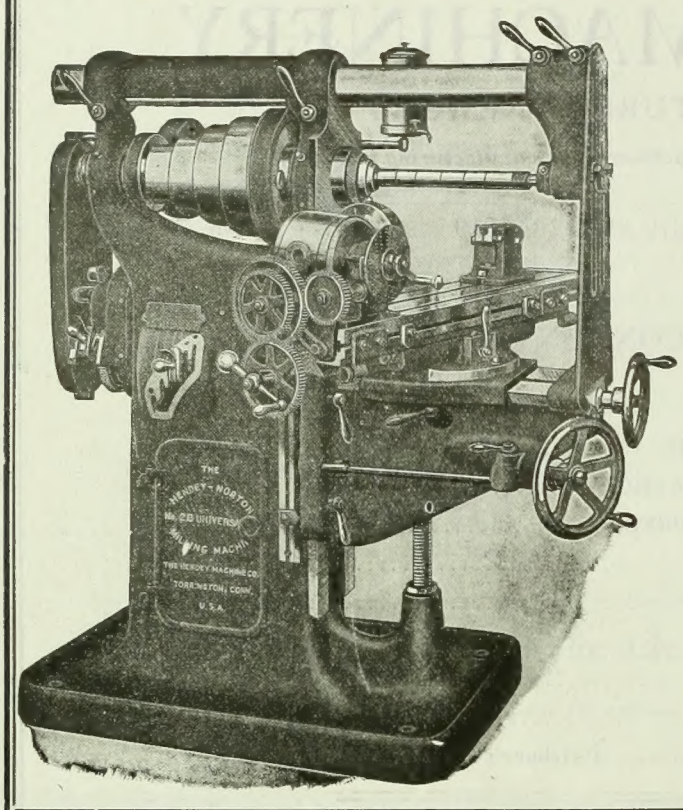

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INDEX TO ADVERTISERS

A

Algoma Steel Corporation 4
Allen Mfg. Co. 78
Allentown Experimental Works 60
Almond Mfg. Co. 22
American Technical Society 62
Anderson & Co., Geo. 78
Anderson's Efficiency Service 60
Arcwell Corporation of Canada 17
Armstrong Bros. Tool Co. 79
Armstrong-Whitworth Co. 10
Atkins & Co., Wm. 14

B

Banfield, W. H., & Sons 62
Barnes Co., Wallace 60
Baird Machine Co. 81
Beaudry & Co., Inc. 78
Becker Milling Machine Co. 75
Bertram & Sons Co., John 1
Bertrams, Ltd. 60
Betts Machine Co. 9
Bicknell-Thomas Co. 23
Blount Co., J. G. 99
Brantford Oven & Rack Co. 60
Bridgeford Mach. & Tool Works ... 9
Bristol Company 78
Budden, Henbury A. 61
Butterfield & Co., Inc. 21

C

Canada Foundries & Forgings, Ltd... 13
Canada Machinery Corporation .... Outside back cover
Canada Metal Co. 10
Can. Blower & Forge Co. 20
Can. Driver-Harris Co. 83
Can. Fairbanks-Morse Co. 32
Can. Ingersoll-Rand Co. 6
Can. S K F Company .... Front cover
Can. Steel Foundries 7
Can. Winkley Co. 82
Carlyle Johnson Machine Co., The.. 8
Cataract Refining Co. 15
Chapman Double Ball Bearing Co... 8
Chesterman & Co., Ltd. 110
Cisco Machine Tool Co. 67
Coventry Chain Co. 102
Classified Advertising 62
Cleveland Pneumatic Tool Co. 93
Consolidated Optical Co. 83
Consolidated Press Co. 87
Curtis & Curtis 16
Cushman Chuck Co. 22

D

Darling Bros., Ltd. 79
Davidson Tool Mfg. Co. 27
Davidson Mfg. Co., Ltd., The Thos. 59
Davis Bournonville Co. 81
Deloro Smelting & Refining Co. 11
Dennis Wire & Iron Works 72
Dom. Forge & Stamping Co. 28
Dom. Foundries & Steel, Ltd. 82
Dominion Iron & Wrecking Co. 66

E

Eastern Machine Screw Corp. 22
Electric Steel & Metals Co. 13
Elliott & Whitehall 71
Elm Cutting Oil Co. 80
Enushevsky & Son, B. 79

F

Fetherstonhaugh 67
Financial Post of Canada 65
Firth, Thos. 6
Ford-Smith Machine Co. 10
Foss Machinery & Supply Co., Geo. F. ..... Inside back cover
Frost Mfg. Co., The 79
Fry's (London), Ltd. 18

G

Gurlock-Walker Machy. Co. 67
Garvin Machine Co. 89
General Steel Co. 7
Geometric Tool Co. 55
Giddings & Lewis Mfg. Co. 81
Gilbert & Barker Mfg. Co. 14
Gisholt Machine Co. 31
Gooley & Edlund, Inc. 78
Grant Gear Works, Inc. 79
Grant Mfg. & Machine Co. 21
Greenfield Machine Co. 80
Greenfield Tap & Die Corp. 29
Greenleafs, Ltd. 60
Gutta Percha & Rubber 93

H

Hamilton Gear & Machine Co. ... 26
Hanna & Co., M. A. 6
Hardinge Bros. 99
Hawkridge Bros. 60
Hendey Machine Co. 104
Hepburn, John T. 26
Hinckley Mach. Works 80
Hoyt Metal Co. 82
Hull Iron & Steel Foundries 79
Hunter Saw & Machine Works ... 80
Hurlburt-Rogers Machinery Co. ... 83

I

Independent Pneumatic Tool Co. ... 93

J

Jacobs Mfg. Co. 23
Jardine Co., A. B. 13
Johnson Machine Co., Carlyle 8
Joyce-Koebel Co., Inc. 69

K

Katie Foundry Co. 74
Keystone Mfg. Co. 107
Knight Metal Products Co. 21

L

Landis Machine Co. 82
Latrobe Electric Steel Co. 7
Lynd-Farquhar Co. 20

M

MacGovern & Co. 64
MacLean's Magazine 95
Magnolia Metal Co. 81
Manitoba Steel Co. 81
Marshalltown Mfg. Co. 74
Matthews, Jas. H., & Co. 30
Matheson & Co., I. 65
McDougall Co., Ltd., R. ..... Inside back cover
McLaren, J. C., Belting Co. 80
Mechanical Engineering Co. 16
Metalwood Mfg. Co. 30
Morse Twist Drill Co. 89
Morton Mfg. Co. 61
Mulliner, Enlund Tool Co. 25
Murchey Machine & Tool Co. 23

N

National Acme Co. 75
Nicholson File Mfg. Co. 28
Niles-Bement-Pond....Inside front cover
Normac Machine Co. 61
Northern Crane Works 79
Norton, A. O. 83
Norton Co., The 30
Nova Scotia Steel & Coal Co. 14

O

Oakley Chemical Co. 80
Ontario Lubricating Co. 83
Ott Grinder Co. 82

P

Page Steel Wire Co. 81
Pangborn Corporation 81
Parmenter & Bulloch Co. 80
Peck, Stow, & Wilcox Co. 77
Peerless Machine Co. 20
Plessisville Foundry Co. 67
Plewes, Ltd. 63
Port Hope File Mfg. Co. 28
Positive Clutch & Pulley Works .. 79
Pratt & Whitney.....Inside front cover
Presto-O-Lite Co. 76

R

Racine Tool & Machine Co. 18
Record Foundry & Machine Co. ... 65
Rice Lewis & Son 72
Ridout & Maybee 61
Roelofson Machine & Tool Co. 84
Rockford Drilling Machine Co. 97
Rockwell Co., W. S. 80

S

Shipman & Co., H. C. 63
Shore Instrument Co. 83
Shuster Co., F. B. 78
Silver Mfg. Co. 79
Simonds Canada Saw Co. 18
Skinner Chuck Co. 78
Smalley-General Co., Inc. 25
Smith, R. Home 63
Standard Fuel Engineering Co. 87
Starrett Co., L. S. 19
Steel Co. of Canada 3
Steinle Turret Machine Co. 82
Steptoe, John, Co. 99
St. Lawrence Welding Co., Ltd..... 71
Stoll Co., D. H. 78
Strong, Kennard & Nutt Co., The. 88
Swedish Crucible Steel Co. of Can. 81
Swedish Steel & Importing Co. 12

T

Tabor Mfg. Co. 79
Taylor Instrument Co. 17
Toronto Iron Works 81
Trahern Pump Co. 26

U

United Brass & Lead, Ltd. 69, 82

V

Vanadium-Alloys Steel Co. 12
Victoria Foundry Co. 69
Vulcan Crucible Steel Co. 12

W

Wells Bros. Co., of Canada 27
Wentworth Mfg. Co. 72
Wheel Trueing Tool Co. 79
Whitcomb-Blaisdell Mach. Tool Co. 97
Whitman & Barnes Mfg. Co. 99
Wilkinson & Kompass 82
Williams & Wilson, Ltd. 70-71
Williams, A. R., Mach. Co. 55
Williams & Co., J. H. 76
Willys-Overland, Limited 68
Wilson & Co., J. C. 59
Wilson & Co., T. A. 83
Wilt Twist Drill Co. 5
Wood Turret Mach. Co. 83

Z

Zenith Coal & Steel Products, Ltd. 66
Elliott & Whitehall 71

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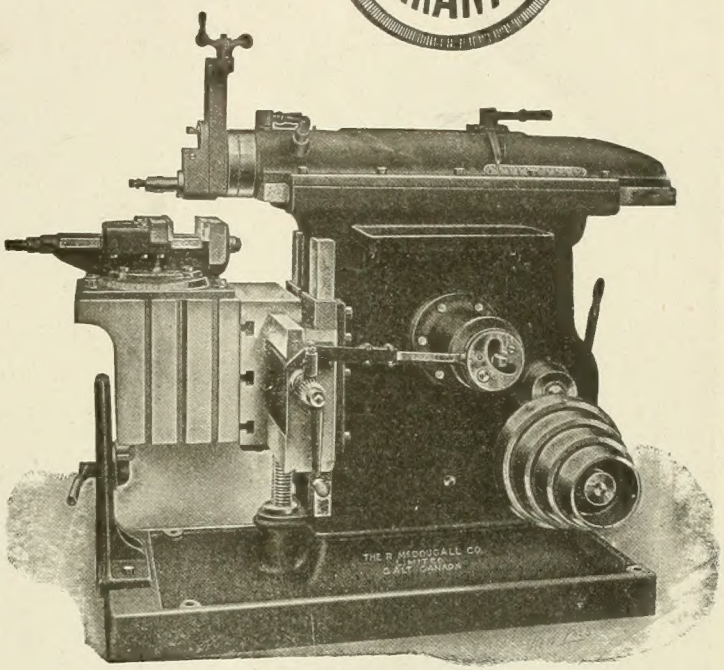

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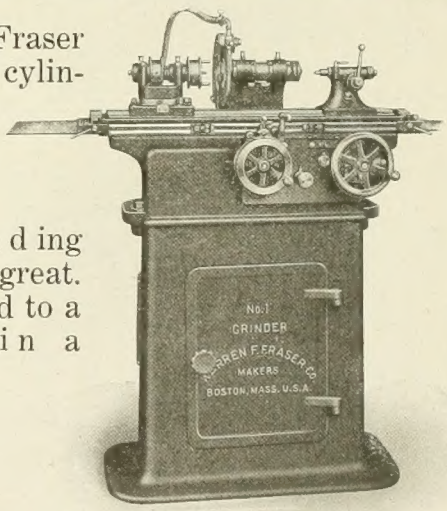

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